Subsidizing Overproduction

THERE is no division of industry in these United States that has a problem today which cannot be covered by one word—**Overproduction.**

It makes no difference whether the commodities be paper, steel, cotton, town lots in Florida or wheat in North Dakota. If more of these commodities are produced than the country can consume, there will always be the problem of disposition. The penalty is a price lower than production cost.

This proposition is as plain and axiomatic as "the shortest distance between two points is a straight line." It needs no demonstration to anybody except nit-wits and idiots.

The law of supply and demand is as fundamental and unalterable as the law that governs the tides.

When the supply is greater than the demand, the price of the commodity declines. When the demand is greater than the supply, the price of the commodity rises. It never has operated otherwise and never will—the United States Senate notwithstanding.

And yet, on Friday, February 4th, in the United States Senate at Washington, Senator McNary from Oregon introduced a farm relief bill which has but one objective—to set the law of supply and demand at naught. "Agriculture," says the learned solon, "needs an artificial stimulus." "The artificial stimulus" is the subsidizing of agricultural overproduction. His bill creates a federal farm board made up of farmers, who are to purchase with taxpayers' money the surplus crops raised in the United States. By control of the surplus, they intend to create a profitable market at all times for the farmer. What they are going to do with the surplus, where and to whom they are going to sell it, only the good Lord knows, and Senator McNary has not yet revealed the destination to his colleagues.

The Senator is quoted as saying that "the artificial stimulus to agriculture is just as great a necessity as to set up an artificial tariff and immigration barrier." Note the use of the word "artificial." He admits his "stimulus" is artificial, but he tries to besmirch the properly protective tariff and defensive immigration act with the same tar.

But that's not the half of it. May there not be a covert notice to Senators from the great industrial states of the Union and also covert threats to the great labor constituencies, that unless they vote this "stimulus" to agriculture, the farm bloc will pull down the tariff fences and fling wide the gates to unlimited immigration?

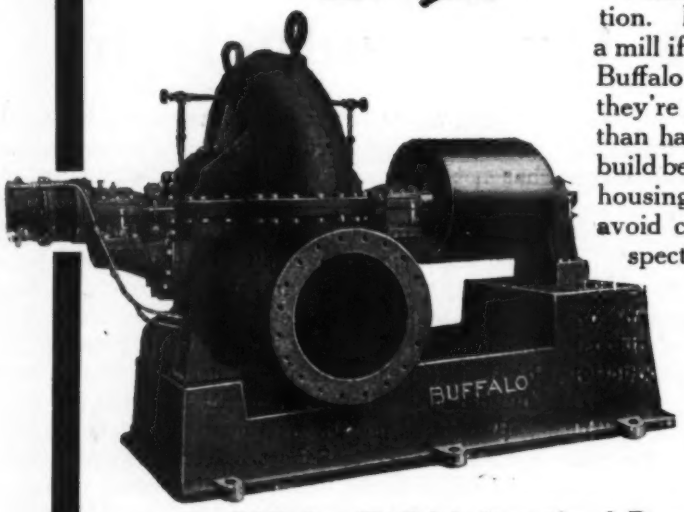
Five million surplus bales of cotton were raised last year. What's to prevent a surplus of **ten** million bales next year and **twenty** million bales the year after?

Oh, boy! What a wonderful opportunity to make money in the agricultural industry for a few years until this "artificial stimulus" is withdrawn, and the whole bubble bursts!

Talk about Florida's land speculation! Why not take over their surplus subdivisions?

And while we are subsidizing agriculture, why not subsidize overproduction in other industries also? There is yet time to amend the bill. Telegraph your Senators! Write them letters! Send them round robins! Collect a powerful lobby at once and let's move to Washington. Have the overproduction in the box board, sulphite bond, and bag divisions of the paper industry given a few

Steady production with "Buffalo" pumps



ONE of the essentials to profitable paper mill operation is continuity of production. Pumps, particularly, can paralyze a mill if they fail. That's one reason why Buffalo pumps are popular wherever they're used. We build each part to more than handle the strains it will meet. We build bearings to lubricate steadily. Rotors, housings, inlets and outlets are made to avoid clogging, and hand-holes make inspection and cleaning quick and easy.

Here's what some users of Buffalo "Class S" pumps for paper mills say about them:

"This pump ran 210 days without a stop, and is going today as good as the day it was installed."

"All the (Buffalo) Centrifugal Pumps that we have installed are giving satisfaction."

"—the two double suction pumps have been in operation more or less continuously for four years, and have given us entire satisfaction."

If you want pumps of this calibre in your mill—let us quote on your requirements.

Buffalo Steam Pump Co.

213 Mortimer St. Buffalo, N. Y.

In Canada—Canadian Blower & Forge Company, Ltd., Kitchener, Ontario

"Buffalo" Pumps for paper mills

EDITORIAL

shots of this "artificial stimulus" of Dr. McNary's.

The farmer enjoys a tariff on wheat, corn, cotton, and all his products are protected. What Senator McNary is after is a subsidy for the farmers because they are overproducing. We agree to that subsidy for the farmers with this one exception—we have some overproducers in the paper business; take them in, Dr. McNary, and we'll vote for your bill. That will make the folly unanimous.

Sportsmanship and Production

"YOU are using a freeness tester," said the Casual Visitor to the Superintendent. "You make no pulp; you buy it all. For that are you using a freeness tester, may I ask?"

"We make a freeness test of every beater we drop," said the Superintendent. "Some of the advantages are obvious; increased efficiency of machine operation, increased uniformity of finished product. But the way in which we cash in on the freeness tester was never anticipated.

"It seemed to work like this. The machine tender has production figures over which to swell with pride or to bring him to shame. The beater engineer has nothing. As soon as the freeness tester was thoroughly understood in our beater room, the beater engineers vied with each other in maintaining the uniformity of the stock supplied to the machine. There were the figures, too, by which the machine tender who was making a big run could see that some of the credit belonged to the uniform stock he had on his tour. It became a sporting proposition."

Here is a factor in production which paper mill operators could turn to their advantage in greater degree. This mill finds that a freeness tester has aroused greater interest in the job on the part of the beater engineer. Another mill is saving thousands of dollars a year by letting the backtenders know how much steam they are using. A third tells the super-calender men how much of the paper they waste when it is in their hands. A fourth does the same for the girls inspecting the paper.

It turns to operating advantage the sportsmanship inherent in every American skilled workman. If the figures are furnished so that all may see, no one man is going to let himself be last if he can help it, and the majority are going to be first as many times as possible. Where there are no records, the prevailing attitude is one of censure, because only when the work is so bad that something has to be done about it is any one workman singled out—and then for a jacking-up. Where there are records, the superintendent's attention can be more frequently turned to the comparative work of all hands from the more desirable standpoint of handing out praise for leadership.

Instruments for technical control, certainly, but no paper manufacturing organization can afford to overlook this further advantage possible from recording instruments and records. The mills which work out for each important job a test or figure to show the man how he compares with his fellows will benefit from the sporting instinct uppermost in the heart of every American workman.

Accidental Discoveries

IN VIEW of the extraordinary interest attached to efforts that are being made both in the United States and Europe to effect a modification of the sulphite cooking process so as to produce an increased yield of stronger fiber with a minimum of waste, a review of processes, patented and otherwise, in which an alkaline base is substituted for the lime now employed in making sulphite acid, should be of great suggestive value. An article dealing with this, which was contributed to our Berlin contemporary, The Papier-Fabrikant, is given in translation on other pages in this issue of THE PAPER INDUSTRY.

The great drawback to the use of alkalies as bases for sulphite liquors has been the difficulty of effecting an adequate recovery of the chemicals employed in the process. Later developments in the study of a modified process, which have not yet been made public, indicate that work on recovery methods is under way which will assure a solution of the problem. This would mean, at the same time, a solution of the stream pollution problem, for there would be practically no effluent from the process of a kind that now makes it necessary to dispose in various ways of enormous quantities of spent sulphite liquor.

The discovery of sulphite cooking with sodium bisulphite liquor goes further back than many people have any idea of. Thus it is shown in the article by Doctor Hausen, in the translation above referred to, that Kellner, whose name is inseparably associated with the sulphite process since Tilghman's time, in studying the problem of regenerating the black liquor from alkali cooking, by an

Now in Its 50th Year of Service to Industry

1877 The small workshop shown above represented the Jeffrey Manufacturing Company half a century ago.

WHEREVER coal is mined or converted into steam and electricity—

Wherever rock and clay and sand are turned into brick and cement—

Wherever logs are ground into pulp, and pulp rolled into newsprint—

Wherever manufactured products are carried from process to process—

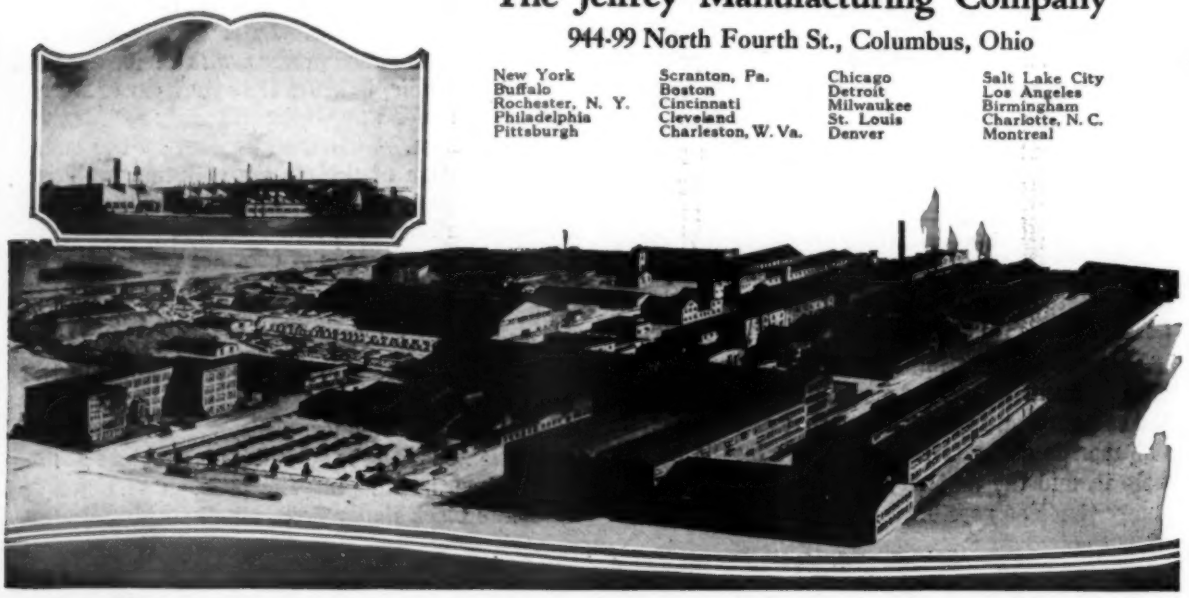
There Jeffrey Material Handling Equipment carries an important part of the load.

In fact, during the half century since its organization in 1877, the Jeffrey Manufacturing Company has solved material handling problems for every basic industry.

In the future new problems will arise, and for these also Jeffrey Engineers will find practical solutions.

The name JEFFREY, like the *sterling* stamp on silver, has come to mean "the guarantee of a trustworthy product."

1927 The present plant as shown below together with its malleable foundry, in the panel, covers more than 60 acres of ground.



The Jeffrey Manufacturing Company

944-99 North Fourth St., Columbus, Ohio

New York	Scranton, Pa.	Chicago	Salt Lake City
Buffalo	Boston	Detroit	Los Angeles
Rochester, N. Y.	Cincinnati	Milwaukee	Birmingham
Philadelphia	Cleveland	St. Louis	Charlotte, N. C.
Pittsburgh	Charleston, W. Va.	Denver	Montreal

EDITORIAL

accident of his laboratory assistant made a batch of sodium bisulphite liquor and found that a good well bleached, and above all, stronger pulp could be produced with it than by means of a plain soda cook. He had been endeavoring to regenerate black liquor by passing in sulphurous acid followed by causticizing with lime, and one batch had been treated in this way, except that treatment with lime had been inadvertently omitted, so that the liquor consisted principally of a solution of sodium bisulphite. In later years, Drewsen and others occupied themselves with the same problem, and one of the modern developments is now known quite generally as the Keebra process.

In the history of all great industries it is found that accidental discoveries have been influential in the development of new processes and products, and in few more than the pulp and paper industry. There is the case of the kraft process. "Sulphate" and "kraft" are terms that are now used interchangeably, but kraft pulp properly refers to an undercooked sulphate pulp. Kraft pulp, so called, dates from 1879 when C. F. Dahl, of Danzig, began to experiment with the substitution of sodium sulphate for soda ash in replacing soda lost in cooking straw, and kraft paper owes its origin to the blunder of a digester man in the cooking of sulphate pulp from wood. In 1885, at the Munksjö mill in Jönköping, Sweden, where Dahl's process was worked, a digester was blown before the chips were sufficiently cooked. The mill was operated at that time by Alvar Müntzing, who was in later years, down to 1917, secretary of the Swedish Paper Mills Association and at the same time editor of the Svenks Pappers-Tidning. His attention being called to the digester man's mistake, he ordered the pulp to be run through a kollergang with the idea of making an inferior paper from it. The result, however, was a paper surpassing in strength any previously made, and undercooking afterwards became the regular practice in a number of mills for the production of a wrapping paper that was so strong in comparison with similar papers that it was named "kraft," this being a word common to the Swedish and German languages and in each meaning force, vigor or strength. The kollergang is no longer used today, except perhaps in some mills where hard specialty papers and paper furniture are made, but it has not yet been demonstrated satisfactorily that the beater and jordan engines which now do its work are in any way equal to it for the production of a real kraft paper.

Perfect Safety Scores

THE 1927 Safety Contest of the Paper and Pulp Section of the National Safety Council, promoted by THE PAPER INDUSTRY, has passed the January lap of its six months' term. Of the one hundred and nineteen mills enrolled to date, forty-one of which are in this annual contest for the first time, thirty-six mills have thus far sent in their accident reports and **sixteen have perfect scores.**

For this number, the record is a little better than that made in August, 1925, when sixteen perfect scores were made out of forty-one mills that were entered in the contest. A comparison of severity rates is also much in favor of the present race.

George Burns, National Safety Council engineer, who has all the details of the contest in charge, has made the gratifying announcement that W. J. Cameron, managing director, decided that the Council will donate the three silver loving cups to the winners of the three groups—a magnificent award offered in respect for the splendid spirit and enthusiasm existing in the Paper and Pulp Section.

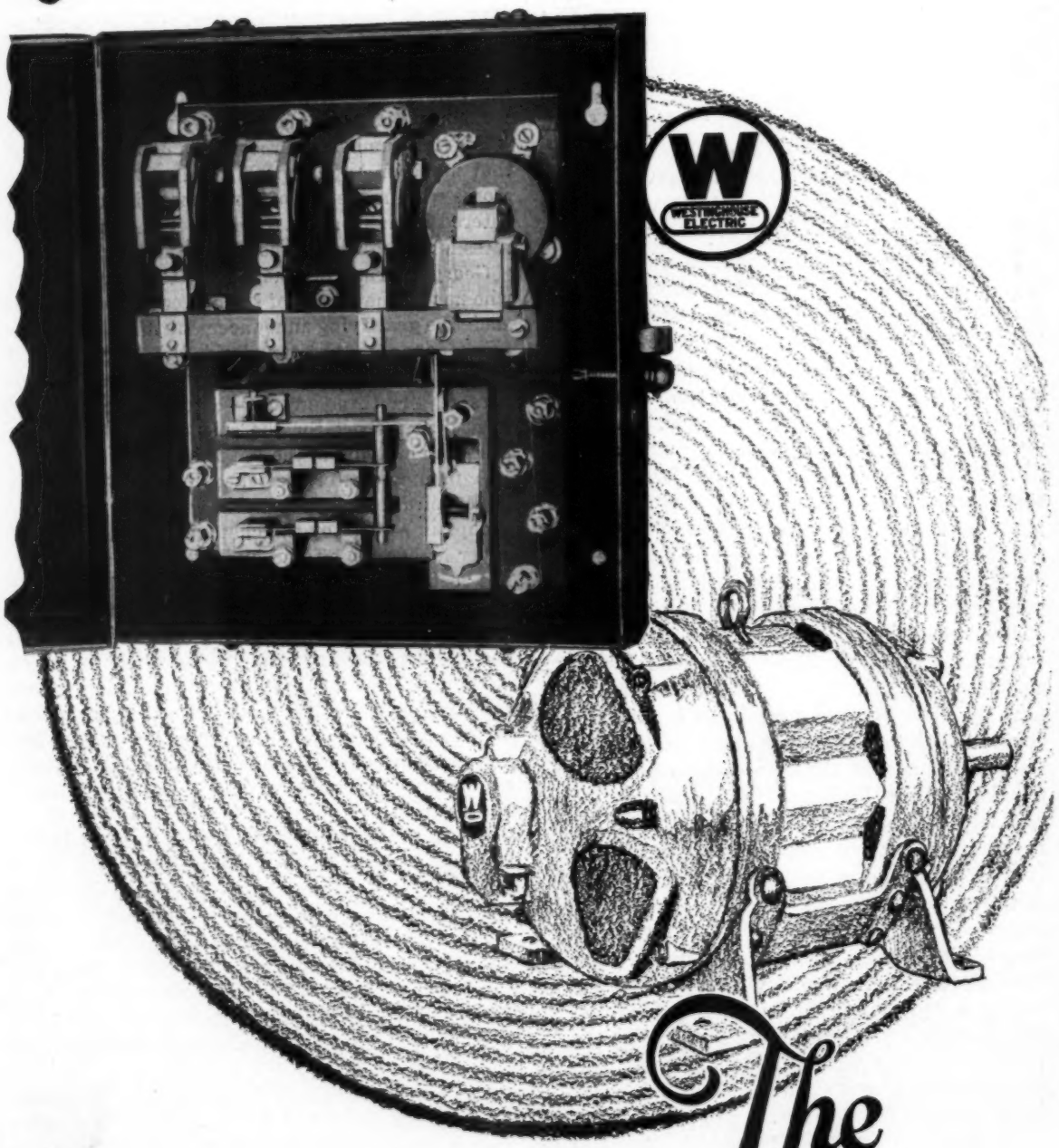
A flaming poster, designed by the Council for the inspiration of contestants, showing the three groups in a race for the championship award, the silver loving cup offered by THE PAPER INDUSTRY, has been mailed in quantities to all members of the Section.

Among the companies having inter-mill contests, the latest reports are that the ten mills in which George H. Mead, of Chillicothe, Ohio, is interested, are striving for a silver trophy offered by Mr. Mead to that mill making the lowest no-accident record for one year beginning April first. Safety contests are proving to be a great help in the reduction of accidents.

There are eight Canadian mills entered in the 1927 contest; three of them in Group A, one in Group B, and four in Group C. Those attending the Detroit Congress will recall the threat of our distinguished friend, A. P. Costigane, who by the way has just been elected chairman of the Technical Section of the Canadian Pulp and Paper Association, that the cup will cross the line in 1927. This assertion has been challenged by many. May the best mill win.

Since accident reports are due to be in the hands of the Council by the fifteenth of the following month, this is too late for them to be published in that month's issue of THE PAPER INDUSTRY, and they will appear sixty days after the month of record. The record for the month of January will therefore be published in our March issue.

More than



The Westinghouse

X91048

THE PAPER INDUSTRY

REG. U. S. PAT. OFF.

Vol. 8 FEBRUARY, 1927 No. 11

Cost Accounting for Paper Mills

Part IV—Posting the Product Manufacturing Costs

By CHARLES WILLIAM GOULD, JR.

Previous chapters of this series by Mr. Gould appeared in the August, September and December, 1926, issues of THE PAPER INDUSTRY. *The next chapter will be a continuation of the subject "Costing the Product," dealing with Finishing Costs. It will appear soon in another issue of this magazine.*

FOR payroll purposes, hours allowed, daywork (in case of piece workers) and piece work units (pounds, packages, sheets, etc.) should be posted daily to the payroll from the various operation reports in use. In case of employees turning in time weekly by means of recording clock cards, the hours should then be posted weekly. Total hours and piece work units should be extended on the payroll records and total earnings for the week calculated; rentals and other miscellaneous items deducted and the net amount due employees carried to the column assigned to the current pay period, after which a payroll distribution should be made.

Indirect labor should be distributed under the expense classification number 2 (see Expense Classification, Burden Accounts, Page 807, THE PAPER INDUSTRY, August, 1926) with a further classification as follows:

2—Indirect Laber—General.

2a—Indirect Labor—Supervision and Clerical.

2b—Indirect Labor—Idle Time.

A list should be drawn up showing the employees coming under classification number 2 and those under classification number 2a in each center. If employees whose time is regularly charged as direct labor, such as rag hand cutters and rag inspectors, sheet calender girls, plater girls and paper sorters do work of a general nature which cannot be charged directly to cost, such time should be shown on the proper operation report, viz:

Rag Inspection Report.
Rag Hand Cutting Report.
Sheet Calender Operation Report.
Plater Report.
Sorting Report.

and a brief description of the work performed recorded in each case.

Weekly Time Report—Miscellaneous (Fig. 15) is designed especially for the use of millwrights, maintenance men, carpenters, yard men and others when not regularly employed in one department. One report should be made out each week by the foreman

WEEKLY TIME REPORT - MISCELLANEOUS

WEEK ENDING EMPLOYEE CLOCK NO.

DAY	ELAPSED TIME START	STOP	HRS	OPERATION	NO.	FOR OFFICE USE ACCT.	HRS	ALLOWT

Figure 15

or his assistant, for each employee working in the above mentioned groups. The approximate time each job is started and finished, the department in which each job is done, and a brief description of the nature of the work should be shown.

Standing order numbers should be set up for each department or center, to which all time spent and material used in making what may be termed

normal repairs and also all miscellaneous indirect labor and expense should be charged. A list of such standing order numbers should be prepared and a brief explanation of the character of the equipment in each center given.

All time reported on Weekly Time Report—Miscellaneous should thus be charged either to a standing order number for repairs or indirect labor, or to a construction maintenance order number.

If it happens that an employee regularly engaged as millwright, carpenter or yard man should do work

SORTED RAG INVENTORY

WEEK PERIOD ENDING ____ GRADE OF RAGS ____

NO	ITEMS	COST OF SORTED RAGS QUANTITY	RATE	COST	SORTED RAGS USED - STANDARD COST BLEACH NO	QUANTITY	RATE	COST
1	GROSS WEIGHT BALED RAGS							
2	BURDEN - RAG STOCK H & S							
3	DIRECT LABOR - RAG HAND CUT.							
4	BURDEN - RAG HAND CUT.& SPRR.							
5	DIRECT LABOR - RAG INSPECTION							
6	TOTAL							
7	NET WEIGHT SORTED RAGS							
8	ON HAND LAST PERIOD AT COST							
9	RECEIVED FROM							
10	TOTAL							
11	USED THIS PERIOD AT COST							
12	TRANSFERRED TO							
13	BALANCE ON HAND AT COST							
14	BALANCE ON HAND (INVENTORY)							
15	INVENTORY ADJUSTMENT							
	PRICE VARIANCE							
16	USED THIS PERIOD AT ACTUAL COST							
17	USED THIS PERIOD AT STAND.COST							
18	VARIANCE							

Figure 16

as direct labor, i.e., chargeable directly to a paper in-process lot or sub-lot number, the number should be recorded in the column headed Order or Lot Number, and the time chargeable posted to the back of the proper lot Cost Summary card.

In making the payroll distribution, all time charged to standing order numbers for repairs or to construction in process should be entered as indirect labor in the maintenance department, Burden Account No. 52-2, while all time charged to standing order numbers for miscellaneous indirect labor should be charged to the Burden Ledger account number and subsequently entered on the proper Comparative Statement of Burden sheets under the expense classification number 2, 2a or 2b as may be proper.

The direct labor cost of dressing rags and of rag inspection should be obtained by grades, from the Daily Rag Hand Cutting Reports and the Daily Rag Inspection Reports and the summary totals shown opposite Dressed Rags, Account B-15. At the close of the period the totals by grades will be carried to the Sorted Rag Inventory cards (Fig. 16) as item 3, Hand Cutting Labor and item 5, Rag Inspection Labor.

The total direct labor of the sheet calender and plater operators as well as that of the paper sorters will be gathered from their respective operation reports and the accumulated weekly totals posted to account number B-17 Paper in Process, while the detail charges to the various lots processed are recorded on the back of the proper Lot Cost Summary cards as will be explained in connection with finishing costs.

At the close of the period, the weekly figures appearing opposite each item on the payroll distribution should be cross-footed, and after proving with the payroll a journal voucher should be prepared, charging or crediting the various general ledger accounts affected.

Maintenance Man-Hours

Weekly Time Report-Miscellaneous, will be used also as a basis for a maintenance man-hour distribution. As previously discussed, hours chargeable to standing order numbers for repairs and to construction maintenance order numbers should be posted opposite the proper account number, in the former case and opposite the proper construction maintenance order number in the latter case.

A register sheet should be designed, showing the center number and name and providing columns for recording man-hours weekly. At the close of the period, the man-hours collected will be cross-footed to a column headed Total Man-Hours. Total man-hours in each center multiplied by the burden rate for the Maintenance department, as established by the development of the Standard Burden Charges, and the burden thus obtained, recorded in a column headed, Total Burden.

A sub-total should be made of all burden chargeable to normal repairs in each center, this sub-total being recorded as B-40 Burden Control. Similarly, a sub-total will be made of all burden chargeable to construction maintenance order numbers and shown as B-30 Construction in Process. The sum total will be shown as a credit to B-40 Burden Control.

From the burden figures thus obtained, a journal voucher should be prepared charging B-40 Burden

ANALYSIS - BALED RAGS OPENED

GRADE	COST OF BALED RAGS QUANTITY	UNIT	COST	SHRINKAGE BACKING WIRE	DUST WIRE	SORTING OUT-TARE	TOTAL SHRINKAGE POUNDS	%	NET WGT SORT.RAGS

Figure 17

Control with the cost of normal repairs (the detailed distribution to the various centers being indicated); and B-30 Construction in Process with the cost of special jobs and crediting B-40 Burden Control (52 Maintenance) with the total earned burden in the maintenance department.

Construction Records

When construction or maintenance work is con-

templated, which is of some magnitude and out of the ordinary run of such work (i.e., not properly chargeable to a standing order number for repairs) and where specific costs are desired, the superintendent or other individual charged with the responsibility of supervising such work should issue a Construction Maintenance Order.

This order, which may be simple in design, should bear a comprehensive description of the work to be done. The original copy of the order being retained by the issuing office and copies issued to all foremen who will have direct charge of the work; to the stores clerk and the Cost department. Construction Maintenance order numbers should run serially and a memorandum of the names of foremen and others to whom copies have been issued recorded on the original and all copies.

All time spent and all material used on jobs for which an order has been issued should be charged by foremen and stores clerks to the proper job number.

When the Cost department copy of the Construction Maintenance order is received, a Construction Record should be made out, bearing the Order number, and a description of the work together with the date the work was started. This record should be so designed to collect the cost of the various items entering into the job.

When a job is completed, the foremen will turn in their copies of the corresponding order number to the stores clerk, who in turn will attach the Stores department copy and send all copies to the Cost department. This procedure will serve as a notice that the job has been completed.

Stores Requisitions should be forwarded to the

REPORT OF SORTED RAGS USED

NO. OF KETTLES | KETTLE NUMBER | GRADE | BLEACH NO.

DATE STARTED | DATE COMPLETED

POUNDS OF SORTED RAGS BY GRADES				MATERIALS	
				QUANTITY	KIND
				ADDITIONS	
				CREDIT BLEACH NO.	
				DEDUCTIONS	
				CHARGE BLEACH NO.	
				SORTED RAGS USED THIS REPORT	
				ADDITIONS	
				DEDUCTIONS	
				TOTAL	

Figure 18

Cost department at the close of each day, for all material and supplies charged to each C-M Order in process. The details, as to kind, size and cost of materials, will be recorded on the proper Construction Record, under a section reserved for "Analysis of Charges." The total burden for the period will be obtained from the Register of Maintenance Man-Hours, as heretofore explained.

When a job has been completed as indicated by the receipt in the Cost department of all copies of the C-M order, the total cost of the job will be ascertained and a copy of the completed record sent to the superintendent.

A Journal Voucher should be prepared at the close of each period, charging the cost of all jobs completed during the period to the proper reserve or asset account or repairs in the proper department (depending upon the nature of the work) and crediting account B-30 Construction in Process. The sum of

WASHER REPORT

DATE STARTED | DATE COMPLETED | BLEACH NO.

WASH NO.	FURNISHED DATE	TIME	RETURNED DATE	TIME	DR. NO.	BLEACH QUAN.	CODE	WASH NO.	FURNISHED DATE	TIME	RETURNED DATE	TIME	DR. NO.	BLEACH QUAN.	CODE

Figure 19

material and burden charged to jobs in process, as indicated by the corresponding in process Construction Records should agree at the close of each period with the balance in the general ledger account B-30 Construction in Process.

Sorted Rag Inventories

As previously explained, when bales of rags are opened for use, the bale tags are removed and collected, the date opened being recorded on the back of each tag, together with the scale weight of the sacking and wire removed from the bale. At the end of each day all tags should be forwarded to the Cost department, and there matched up with the corresponding stubs. The lot number, bale number, pounds, value and tare being recorded on the aforementioned Material Used Register sheets. A separate set of sheets should be used for each grade of baled rags, conforming of course, to the classification in use. At the close of the period, a set of Sorted Rag Inventory cards (Fig. 16 front, and Fig. 17 back) should be headed up, indicating the grade of rags and the date at which the period ends. At this time all Material Used Register sheets should be footed and the total weight, cost and weight of sacking and wire, recorded, by grades, in the spaces provided on the reverse side of the card (Fig. 17).

The quantities of dust and sorting out-throws should be obtained from an analysis of the Weekly Rag Room Report of Sorting Out-throws, on which should be shown the quantities of dust and muss, together with the weight of all objectionable materials.

The total weight of sacking and wire, dust and muss, and sorting out-throws should be recorded as indicated and the total shrinkage both as to pounds and percent stated. The total shrinkage deducted from the gross weight should be entered in the column to the extreme right, designated Net Weight Sorted Rags.

The total gross weight and rag cost for each grade of sorted rags should be re-stated in the columns provided opposite item 1 on the face of the Sorted Rag Inventory card. Item 2, Rag Stock Handling and Storage burden should be calculated using the burden rate per pound handled, multiplied by the total weight of baled rags opened. Item 3, 5, Rag Hand Cutting and Rag Inspection labor should be entered as indicated from the payroll distribution; this distribution being made by grades of rags. Rag Hand Cutting & Cut Rag Storage Burden should be calculated and applied to the grades of rags so processed. The total cost of baled rags, rag hand cutting and inspection labor, and the burden charges should be added together and brought down as item 6. Item 7, Net weight Sorted rags will be obtained from the back of the card. To the net figures should be added the pounds and value of rags on hand at the close of the previous period, the pounds and value of sorted rags received from other grades, and from these figures should be deducted the pounds and value of sorted rags delivered to other grades, as well as pounds and value of sorted rags used, the result being brought down and shown opposite item 13, Balance on Hand at Cost.

A standard cost should be calculated each period for each grade of sorted rags, this cost being influenced by market conditions. The standard cost should be used for calculating the value of all sorted

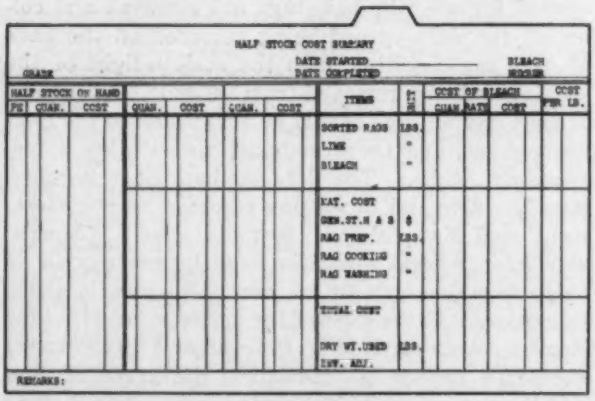


Figure 20

rags in each grade used in bleaches during the period. The quantity and standard cost of sorted rags used, together with the bleach number to which furnished should be recorded as indicated on the card. The total actual cost of sorted rags used will be obtained by multiplying the pounds used by the unit cost of item 10. The difference between the total standard cost and the total actual cost of sorted rags used should be entered as indicated, under the section headed, Price Variance.

At the close of the period, journal vouchers should be made up summarizing Sorted Rag Inventory Cards for the period by means of which account B-1 Rags, should be credited with the total value of baled rags opened and in addition, account 50, Rag Stock Handling and Storage and account 2, Rag Cutting and Cut Rag Storage will be credited with the earned burden, while account B-15 Dressed Rags receives the corresponding charge. The net difference be-

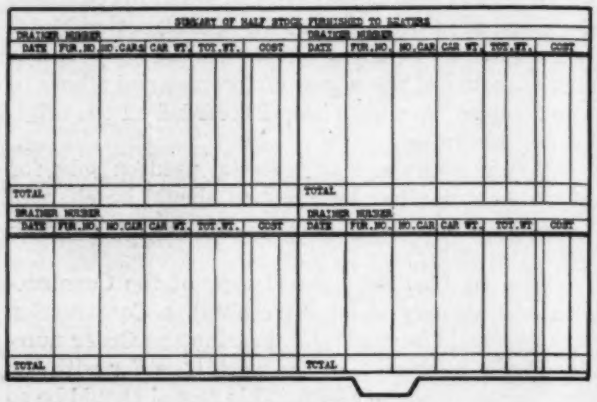


Figure 21

tween the standard cost and the actual cost for each grade of rags should form the basis for a journal voucher, charging or crediting account J-4 Raw Material Price Variances, and crediting or charging account B-15 Dressed Rags, leaving the balance in this account at the correct figures as shown by the totals of the items on the various Sorted Rag Inventory cards.

It will be necessary from time to time to check the actual quantities on hand with the balance of sorted rags of each grade as indicated by item 13, Balance On Hand Inventory. The actual balance should be recorded opposite item 14 and the difference between the actual and book balance brought down as an inventory adjustment, item 15, and a journal voucher prepared charging or crediting account B-15 Dressed Rags with the net inventory adjustment for the period, the corresponding credit or debit, being to account J-1 Inventory Adjustment.

Half Stock Cost Summaries

Dressed or sorted rags are run through the cutters, duster, kettles, washers and into the drainers by bleaches. A bleach consisting of a quantity of dressed rags of any given grade, which may be handled in a convenient number of drainers, without the necessity of partially filling any drainer; and bearing a serial bleach number. A drainer should never be used to hold half stock from more than one bleach number and the quantity of half stock processed on a given bleach should not be so large as to prevent changing numbers within, say a week.

The washer foreman should be responsible for

changing all bleach numbers and should head up a Report on Sorted Rags used (Fig. 18) for each bleach processed, indicating on the form the bleach number, the date started together with a short description of the grade of rags. This report should then be forwarded to the dusterman, in order that he may record, in the spaces provided on the form, the detailed weights of rags charged to the kettles together with the quantity of chemicals used in the kettling operation.

Should it happen that a quantity of sorted rags

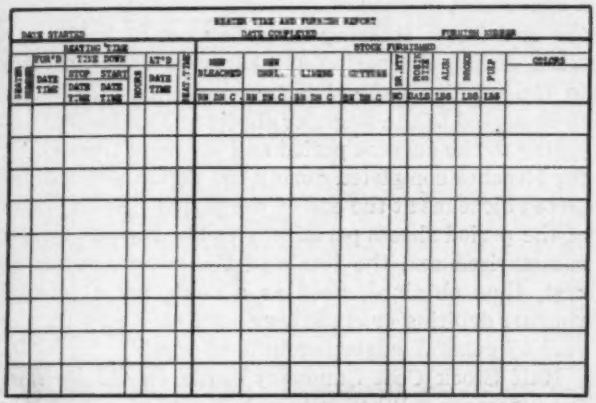


Figure 22

(either cooked or uncooked) put through a bleach cannot conveniently be put into the drainers assigned to accommodate it, the washerman should record the weight of the quantity thus left over, in the space marked Deductions and should show if possible, the following bleach number to which charged.

In the case of unkettled rags, this weight will be actual dry weight, while in the case of kettled rags, it will be an estimated dry weight. The quantity of rags left over, will be charged to the next bleach put through, of the same grade. This quantity should be recorded in the section of the form reserved for additions. When all sorted rags for each bleach have been delivered to the kettles, the dusterman should return the form to the washerman who should then record the date delivery is completed on all reports and forward them to the Cost department.

In case the delivery of sorted rags on any bleach is not completed at the close of the period, the washerman should forward the report to the Cost department as though complete (omitting date delivery completed) and make out a new form for the remaining portion of the bleach.

A Washer Report (Fig. 19) should also be provided and completed by the masherman for each bleach processed. This report should bear the bleach number designating the grade of rags together with the date the bleach is completed. The date and time placed opposite the washer number when the washer is furnished, together with the date and time emptied, will indicate the number of times each washer is emptied. A column is provided in which to record the quantity of bleach or other chemicals furnished to each washer. The drainer number into which each washer is emptied should also be indicated.

When the bleach is completely dumped to the drainers, or at the close of a period, a recapitulation should be made to determine the total amount of chemicals used and also the drainers to which the bleach was emptied. This information should be recorded on the Half Stock Cost Summary card.

Figure 20, Half Stock Cost Summary card has been designed to collect the costs of individual bleaches of half stock made. When a Report of Sorted Rags Used reaches the Cost department a Half Stock Cost Summary card should be made out to show the kind of half stock and the bleach number on which made. The total quantity of sorted rags used being entered opposite the item Sorted Rags and priced at the standard price per pound determined for the period. The quantity of chemicals used being obtained from both the Report of Sorted Rags Used and the Washer Report; these materials being priced from their respective Raw Material cards. To the material cost should be added burden consisting of General Stock Handling and Storage (on the chemicals used) calculated at a rate per dollar value. Rag Preparation, Rag Cooking and Rag Washing burden, all calculated at a rate per pound of sorted rags handled; these burden rates being obtained from the development of the Standard Burden Charges, as explained heretofore. The total cost of the bleach being brought down and recorded opposite Total Cost.

It frequently happens in some plants that a bleach commenced in one period is not completed until a subsequent period. To provide for this emergency, two sets of columns have been designed to the left

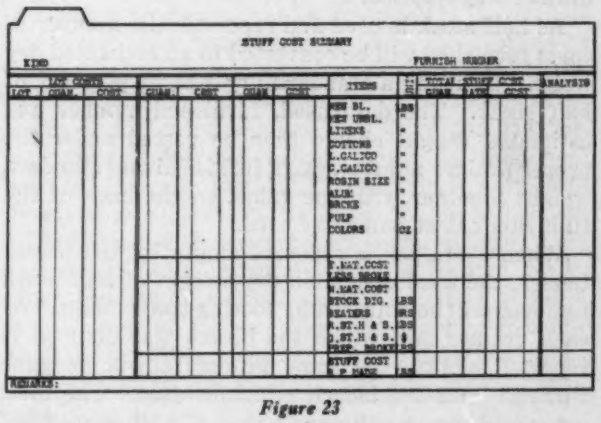


Figure 23

of the form. A card should be made out for all uncompleted bleaches at the close of the period, as though the bleach were finished, in this case however, the quantity and cost figures should be recorded in the left hand set of columns above referred to. The date at which the period closed being recorded at the top of the column. Material and burden cost data collected during the succeeding period posted to the

second set of columns, the date at which the second period ends being similarly written in at the top of the column. The figures for each item for the two periods should then be cross-footed and the totals carried to the cost of bleach section of the card where the total cost should be shown.

A column has been provided at the right of the card for recording unit costs of each item per pound of actual dry weight of sorted rags. Such unit costs being obtained by dividing the cost of each item entering into the total cost of the bleach by the total weight of sorted rags used. Unit costs added together give a total unit cost per pound actual weight of sorted rags, which should be used for pricing the estimated dry weight of half stock charged to furnishes.

The Washer Reports indicate for each bleach, the number of the various drainers into which all the half stock processed has been emptied. These drainer numbers should be recorded at the top of the columns provided on the back of the Half Stock Cost Summary card, Fig. 21.

Half stock carts should be equipped with pockets to hold drainer tags, one such tag being attached to each cart of half stock dug. The stock-digger should be provided with a rubber stamp bearing the word "EMPTY," which he should use to stamp the drainer tag which he places on the last cart of half stock removed from each drainer.

The beater tender should record on the Beater Time and Furnish Report (Fig. 22) the number of carts of half stock furnished to the beaters, also showing the drainer number from which the half stock was taken, the bleach number and the furnish number to which charged and recording the date each drainer was emptied.

As half stock is used and reported, the number of carts furnished will be converted to an estimated dry weight, by using a standard dry weight per cart of half stock. The date used, furnished number and estimated weight should then be posted under the proper drainer number, carts furnished and standard weight together with the value, on the back of the Half Stock Cost Summary card.

When a drainer is reported empty by the beater tender, the total estimated dry weight of half stock removed will be obtained by footing the columns. As each drainer into which the bleach was dumped is reported empty, the same procedure will be gone through until the bleach is finally used. The total estimated dry weight and value of half stock used should then be obtained and carried to the face of the card where it should be entered opposite the side heading Dry Weight Used. The difference between the total cost of the bleach and the value of the estimated dry weight used will be brought down as an inventory adjustment.

Should it happen that a bleach completed in one period is not completely used until a subsequent period, the total quantity and cost, will be carried to the left hand section of the card headed Half Stock On Hand. The partial quantity and value used during the period, obtained from the back of the card, will be deducted from the total quantity and cost of the bleach, leaving a balance on hand both as to quantity and cost. The closing date of the period to which the balance refers recorded in the date column.

A Register of Half Stock Cost Summaries should be designed, the purpose of which being to provide a convenient method of recording currently the various cost items entering into the Cost of half stock made during the period and carrying these in total to the various general ledger accounts. The data to be posted to the Register sheets should be that applying to the current period and obtained from cards for bleaches completed during the period and uncompleted bleaches at the end of the period. At the close of the period sheets pertaining to the various grades summarized and the totals of the several items of cost, thus obtained, used as a basis for a journal voucher debiting or crediting as the case may be, the various general ledger accounts affected.

Half Stock Cost Summary cards should be filed for reference. When a bleach has been completely used, the correspondnig card should be removed from the active file and placed in a closed file. The active file therefore, supports the Controlling account in the general ledger B-16 Half Stuffs. The balance in this controlling account must agree, at the close of the period, with the sum of the individual balances of the Half Stock Cost Summary cards.

Stuff Cost Summaries

A Furnish Order should be made out for each furnish to be processed and should bear a description of the kind of furnish desired, the date issued, the furnish number and the quantity desired. A furnish number should be used to cover all materials furnished to the beaters while the beaters are working on the same quality and color of stuff. In cases where the quality and color are not changed for some indefinite time, the furnish number should be changed at the end of the week and a new furnish order issued, bearing a new number. The furnish numbers should be arranged serially and each new order bearing the next consecutive number.

The materials entering into each furnish and the various quantities of each item desired should be listed in the Superintendent's office, in a section headed Furnish Formula. Any instructions, etc., to be given the beater tender being recorded in a space devoted to Specifications. A furnish order issued to the beater tender, should remain in his possession until the furnish has been changed, or until completed.

A Beater Time and Furnish Report (Fig. 22) should be made out by the beater tender for each

furnish processed. The furnish number being indicated at the top of the form, this being obtained from the furnish order. On the face of the Beater Time and Furnish Report, in the spaces provided should be recorded the beater numbers, the date and time furnished and date and time beater was emptied. In the section of the form headed Beating Time, should be shown the number of hours the beaters have been running, successive starts or stops being indicated in the space provided, under the heading Time Down.

The beater tender should record the number of beaters furnished, the grade of each cart of half stock furnished, the drainer number and the bleach from which it was obtained, from the drainer tags. In addition the quantities of rosin size, alum, broke, excepting broke taken from the paper machine and used on the same furnish, sulphite, and colors furnished, should also be indicated.

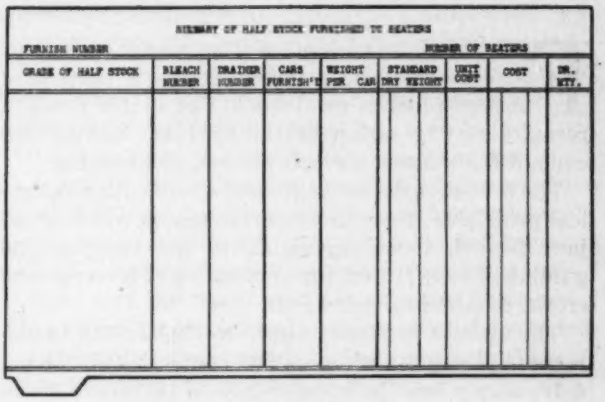
When a Furnish Order is received in the Cost department a Stuff Cost Summary card (Fig. 23) should be made out, indicating the furnish number, and the kind of furnish made. The total quantity of each of the items entering into the cost of stuff being recorded in the section of the card headed Total Stuff Cost. Each one of these items will be priced and extended. The price to be used in calculating the value of the half stock consumed will be obtained from the Half Stock Cost Summary card, corresponding to the number of the bleach from which the half stock was obtained. Bleaches may be easily identified by matching the drainer number recorded on the Beater Time and Furnish Report with the corresponding number appearing on the back of the Half Stock Cost Summary card. The value of rosin size used should be the average cost of rosin size for the previous period; while that of broke being a standard price arbitrarily determined; and should coincide with the probable market price of broke for similar grades of paper. Alum, sulphite and colors should be priced from their respective inventory cards. The total material cost of stuff thus obtained will be brought down and recorded opposite Total Material Cost.

The total pounds of machine broken made on each furnish may be found by footing up the pounds of machine broken as recorded on air drying or loft reports for the lots included in the furnish. Machine broken should be priced, using a standard price per pound obtained as previously indicated, and the total quantity and cost, deducted from the Total Material Cost, leaving a Net Material Cost.

The total time that the beaters have been working on each furnish will be obtained from the Beater Time and Furnish Reports. The total beating time chargeable to each furnish multiplied by the rate per machine hour, derived from the development of the Standard Burden gives the total beater burden. In addition, the handling and storage charge on sulphite, calculated by using a rate per pound, and on chemicals, calculated at a rate per dollar value should be extended. The net material cost plus total burden should be brought down as the Total Stuff Cost.

The total pounds of rough paper made on all lots in each furnish obtained from Air Drying and Loft Reports should be recorded as rough Paper Made.

A furnish started in one period may be carried over into a succeeding period. Extra columns have been provided so that each of the items entering into stuff cost, may be recorded separately, by periods. These columns should be used in the same way as the extra period columns described in connection with Half


SUMMARY OF HALF STOCK FURNISHED TO BEATERS

FURNISH NUMBER NUMBER OF BEATERS

GRADE OF HALF STOCK	BLEACH NUMBER	DRAINER NUMBER	CARS FURNISH'D	WEIGHT PER CAR	STANDARD DRY WEIGHT	UNIT COST	COST	DR. QTY.

Figure 24

Stock Cost Summaries. When the furnish has been finally completed, the cost of each item will be carried across as a total, and recorded in the section headed Total Stuff Cost.

The total quantity and cost of rough paper made on each furnish will be recorded in the left hand section of the card, headed Lot Costs. The total cost of the furnish should then be pro-rated to the various lots which have been made up from the furnish on the basis of the weight of rough paper in each lot. A column has been provided in the right hand portion of the Stuff Cost Summary card to record the unit cost per pound of rough paper made for each item entering into the total stuff cost. Such unit costs should be valuable for statistical purposes, and should be compared with similar unit costs on Stuff Cost Summary Cards for furnishes of a similar grade, which have been previously made, in order to see if any elements of cost are appreciably above or below those for previous furnishes. Any important differences should be investigated, and the causes ascertained.

The reverse side of the Stuff Cost Summary card (Fig. 24) has been designed to provide for a detailed record of half stock used in each furnish. The total standard weight and value of half stock used in each furnish, completed or partially completed during the period should agree with the standard weight and value deducted from the Half Stock Cost Summary cards for the period.

A Register of Stuff Cost Summaries should be provided to collect currently the various items of cost charged to Stuff Cost Summary cards, for furnishes completed during the period and for uncompleted furnishes at the close of the period. This record should be operated practically the same way as the Register of Half Stock Cost Summaries described heretofore. The various items entering into the cost of stuff will be posted to the register sheets, both as to quantity and cost. At the close of the period all columns will be footed and the totals thus obtained, used as a basis for a journal voucher.

Lessons in Paper Making

Lesson IX—Aprons and Shake Control

By HARRY WILLIAMSON
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FOR the information of the many consistent readers of these articles who have been kind enough to write me, I would like at this stage to recapitulate the object of the previous lessons and explain the reasons for this method of grouping.

The first six articles dealt exclusively with mechanical principles: first, those pertaining to winding paper; second, those pertaining to the running and guiding of felts; third, the application of leverage and crown required on press rolls.

The articles primarily aimed to explain the **fundamental principles** of operative control, and did not delve deeply into the many details of texture of clothing, detailed operation with view to preservation, or special operation for any particular quality of paper.

Incidental mention has, of course, been made of specific papers to make clear a point under discussion. In a future lesson group, the detailed operation for the manufacture of different grades of paper and the manipulation of the clothing best suited to this manufacture will be dealt with.

The primary object of the first group of articles is then—to make clear the **mechanical principles** governing the operation of all clothing so that such operation shall be **instinctive** and **subconscious** on the part of the operator.

This foundation is necessary if the operator is to carry on his daily work, employing his best faculties towards the **making of paper.** Too many papermakers are under a constant worry concerning the clothing under their charge.

A **thorough** understanding of **basic principles** will remove this worry, and action in emergency will become instinctively operative.

Our second group, commencing with Lesson VII,, is dealing similarly with the basic principles governing the control of the mixed liquid volume. First we dealt with **slice velocity and control;** then **head box control,** and in this present lesson we will deal with the effect and object of the **aprons** in co-relation to the shake.

The next group will deal with the mechanical and hydraulic principles pertaining to jordaning, followed by the subject of density control in relation to hydration while jordaning. Thus, we will have a broad and comprehensive view of the basic principles governing the manufacture of paper, and from this foundation we may delve into the specific details of machine room operation, and from the requirements of this operation trace back to the pulp mill structural and responsive qualities desired in the fiber, cooked and bleached

Aprons

for our use. The apron has been described as "a shallow flexible trough, bridging the open space between the breast roll and the apron board lip." That sentence most certainly describes its position on the machine, but it must be amplified considerably before we can appreciate its importance.

1—The apron in conjunction with the slice directly affects the quality of the formation.

2—The length of the apron, or a substitute, has a direct relation to the amount of power to be consumed on hydration.

3—The position of the apron influences the flow speed of the mixed volume.

4—The delivery edge of the apron has a direct bearing on the equality of the volume delivered.

5—The length of the apron partially determines the length of the shake stroke.

6—The apron is an important factor in the retention of clay, filler, etc.

7—The apron can either form streaks or help eliminate them, according to the method of its use.

These aids towards the making of paper, according to our adjustment, are points in favor of the use of aprons.

The one outstanding point against their use is that the apron is a stationary object, lying on a running wire mesh and must of necessity introduce friction and consequent wear. This condition is sometimes overstressed, and the balancing of value received and wear incurred must determine whether we use long aprons, short aprons, or no aprons at all.

As with so many other vital parts of the fourdrinier machine, there are factors common to all aprons, and other factors to be decided upon, according to local conditions.

All aprons act as a shallow, flexible trough to bridge the opening between the apron board lip and the breast roll. Therefore, they are fastened to the apron

board behind the slice, continue through the slice opening to at least the center of the breast roll.

The apron edge is the delivery point of the mixed volume to the traveling wire, and by placing this edge on or beyond the peripheral center of the revolving breast roll, the volume is delivered on the same horizontal plane on which the **molding of the surface of the wire travels.**

Should the apron edge be set **behind** the center of the breast roll, the mixed volume striking the roll at a tangent would be materially disturbed, its flow speed checked, and lumps would be formed by small particles of fiber being thrown clear of the suspending medium. A considerable quantity, in ratio to the weight of the volume used, would be lost by its flow weight being greater than the peripheral speed of the breast roll, thus running down behind the roll into the wire pit.

The importance of this minimum point of delivery is obvious when we consider that our efforts preceding the slice have been directed towards obtaining a mixed volume of water and stock of the desired density under guiding control, **the flow weight** of which shall equal the speed of the wire.

Should aprons not be used at all, with ordinary straight slices, then the apron board lip itself must extend to this minimum delivery point—**the peripheral center of the breast roll on a horizontal plane with the molding surface of the wire.**

With patent high speed inlets or slices, it is however the overhanging lip of the slice itself which constitutes the delivery point, and not the apron board lip. In their case, and on some grades of paper, these patent inlets do not require aprons; the apron board lip is set slightly behind center of the breast roll on a horizontal plane with the wire and the edge of the inlet is set directly over the center of the breast roll.

It is this design of patent, high speed inlets—a design which controls the **angle of delivery flow** to the wire and mitigates the **violence** of juncture of the mixed volume with the surface of the wire, which permits the discard of aprons on certain grades of paper, and yet demonstrates the value of aprons on other grades of paper. The patent inlets are therefore supplied, equipped with the neatest facilities for the quick adjustment of aprons if the operator desires to use them.

Aprons and Hydration

Perhaps the most vital area in the making surface of the wire is that area between the center of the breast roll and the center of the first tube roll.

By the difference in diameter of the breast roll and the first tube roll, this area is greater in width than the area between any two tube rolls and is unsupported. It receives the **full weight pressure** of the **volume** delivered from the slice and by the **violence** of juncture in ratio to the angle of such delivery, loses water which is the **suspending medium** on which we rely to support our fibers until they shall be woven into a sheet of paper. We must keep clearly in mind the difference between **water of hydration** and **water of suspension.** The first is a physical component part of the fiber and **is not separable from its fibers** either by violence of delivery or by the capillary attraction of the tube rolls. The second is susceptible to both in greater or lesser degree, according to its temperature.

Again, the greater the degree of hydration of the fiber, the less the volume of suspending water required. Therefore, the less the violence of juncture at the point of delivery, or in other words, the **slower** the stock, the lower the depth of the head carried; the freer the stock, the greater the depth of head carried.

While it is not proposed in this article to deal at length with the very important subject of hydration, yet we may very broadly define hydration as—

> the forming of a colloidal jell around the core of each fiber which by affinity and cohesiveness will lock the fibers together and offer sufficient resistance to the suction pumps to obtain the full benefit of atmospheric pressure on the surface of the paper and the passage of air pressure through the paper to the partial vacuum created in the suction box, thus imparting the maximum compacting strength qualities to the paper.

Thus, we see that in such cases where we are prepared to use hydration to a greater degree, the loss of water in the area between the breast roll and the first tube roll will be less, and a **short apron** extending only to the center of the breast roll is all that is necessary.

On the other hand, hydration costs money in power to develop; costs money in pressure on felts to remove its excess; costs money to raise steam to dry out; and if we can achieve the quality of paper desired with less hydration, then it is sheer waste to develop it. Herein then is the most important factor to guide us as to whether the point of delivery will be at the center of the breast roll, or the covering of this wide drainage area either by extending the apron to the center of the first tube roll, or placing a substitute under the surface of the wire.

We **must have** in any sheet of paper a condition of formation which will offer sufficient resistance to the suction pumps. This is a question solely of **density,** and the manner of obtaining this density decides the length of our aprons. For instance, a heavyweight sheet of book does not demand high strength test qualities, but does require a close formation with high finish. Such a sheet would be composed of **short, free fibers** held in suspension under the influence of the shake the longest possible time, carrying a filler as an aid to surface finish. The shortness of the fiber and closeness of formation would of themselves provide sufficient density to meet the suction conditions, and hydration for this purpose is not necessary.

In the above case, a **long apron** to prevent too rapid loss of **water of suspension** and loss of filler before

such filler had been worked thoroughly into the formation of the sheet by the action of the shake, would be necessary.

Consequently, the length of apron in relation to hydration is decided by whether we want drainage to be retarded by the covering of this important area or by the hydration of the fiber.

Aprons and Control

Control of volume delivered is the next most important factor in the question of long or short aprons, and this only enters where one slice is used. The greater the volume used, the greater the difficulty to control and guide it.

We know that the **flow weight** of volume is controlled by the slice **to** the wire; that is, the weight of volume impounded by the slice is equal to horizontal

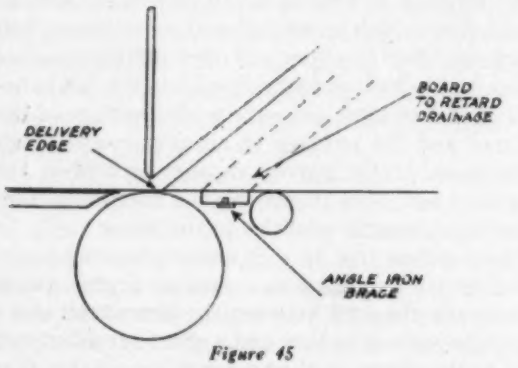


Figure 45

speed of the wire. Therefore, the transference of the mixed volume **immediately** from the slice to the surface of the wire means a retention of control. The greater the area of apron which the volume has to flow over after leaving the control of the slice and before coming under the control of the wire speed, is that much loss of **guiding control.** On speeds below 600 feet per minute, this loss of control is negligible because the weight volume used is not high. However, on the higher speeds with the tremendous volume of water used, this loss of control in the area between the slice lip and the apron edge when using a long apron is vital.

In some mills it is the practice, under these conditions, to prevent a too rapid drainage of water by substituting a well braced board against the under surface of the wire between the breast roll and first tube roll, instead of using the long apron. This board is adjustable and can be set just like a suction box. Its use entails a certain amount of friction to the wire, but as it is always wet and the shake prevents the longitudinal wires from wearing tracks, the amount of wear is not as great as would at first be supposed.

It is again a case of balancing value received against cost incurred, and on those grades of paper where a high speed is required and excess hydration is not desired, the board pays for its use by preventing the drainage of water **until such water has properly performed its duty of holding the fibers in suspension until they are woven into a sheet of paper.**

Aprons and Shake

The length of the apron partially determines the length of the shake stroke.

The primary duty of the shake is to impart a sideways motion to the area of wire between the breast roll and the first suction box so that the fibers shall be interlocked, crossed, and woven together while in suspension.

The shake in its action also retards the drainage of water through the wire mesh. Indeed, the adjustment of the shake may be termed in this relation **the equivalent of water.**

The mechanical control of the shake consists of being able to increase or decrease the length of stroke and increase or decrease the **speed** of stroke, and it is by the finest adjustment of these mechanical facilities, each in relation to the other, that the best results are obtained.

The definition of the use of shake most generally accepted is—

The **freer** the stock, the **greater** the shake; the **slower** the stock, the **less** the shake. This definition, however, is sometimes misleading, its acceptance having grown out of the fact that the greater shake retards the drainage of water.

If the functions of the shake were confined solely to this factor, the definition would remain true, but the primary duty of the shake is to **weave** the fibers together.

Slow stock requires all the drainage area possible. Consequently with such stock, a short apron is installed, and it would seem that less shake would have to be used. Yet, slow stock is sluggish in its action and by the affinity of its colloidal jell is apt to settle too early on the wire, giving a cloudy formation. With this kind of stock, the **length** of the shake stroke should be increased and the **speed** of the stroke decreased.

Free stock suspended in a greater volume of water is more active and volatile on the wire, and a long stroke would create currents and lash the volume from the deckle straps, making weak edges. With this kind of stock, **long** aprons are used, helping to retard the drainage of water, and the **speed** of the shake stroke should be increased and the length of the stroke decreased.

When we consider that the mixed volume having left the control of the slice on the long apron is very much under the influence of the shake and not yet of the influence and control of the wire speed, it is obvious that a long and vigorous shake would be detrimental to even delivery from the apron edge to the wire.

In the co-ordination of the functions of aprons and shake, we can say—

A short apron and a **longer shake stroke** in pro-

portion to its speed; a **long apron** and a **shorter shake stroke** in proportion to its speed.

Setting Aprons

There are many methods of fastening the aprons to the apron board and to the sides of the head box. This must be governed by local conditions. The whole arrangement, however, must be watertight, otherwise stock and water will work underneath the aprons or down the sides, worming out into hard lumps and causing much trouble.

One of the simplest and most effective methods is to use light, beveled strips of wood, one holding down the back edge of the apron, and the others, one on each side, fastening the back edge of the side aprons.

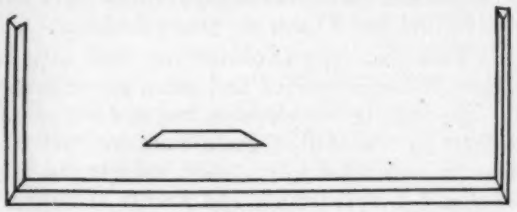


Figure 46

The apron must lay perfectly smooth without wrinkles or puckers, with its delivery edge parellel to the breast roll. Even the slightest wrinkle will create undesirable currents, and worse still, fibers will gather at the end of the wrinkle, breaking away into lumps and causing breaks. (See Fig. 47.)

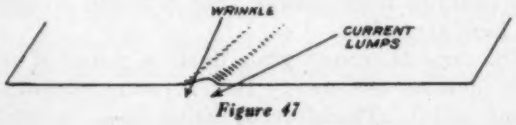


Figure 47

The importance of setting the delivery edge perfectly parallel with the breast roll cannot be stressed too strongly if we are to have an even delivery of volume. Should any portion of the apron lead further down the wire than the rest of it, a greater volume would be delivered at that point.

In this connection we see the value of the use of corner pieces. There is always a certain amount of difficulty in forming good strong edges, due to the back lash from the deckle straps under the action of the shake. By projecting a piece of apron cloth at each edge beyond the actual delivery edge of the apron proper, the fiber is kept in suspension a longer time at the edge, giving it time to flow back to the deckle strap before settling down. There are many styles of these corner pieces or wing aprons according to the necessities of the machine they are on. Figure 48 shows two different types.

In Sketch (A), the corner piece is shown angled **towards** the deckle strap. The flow would be guided into the strap at a point about six inches beyond the end of the corner piece. This type is useful on **slow speeds** when the volume used is not high.

In Sketch (B), the corner piece is shown angled **away** from the deckle strap. This type is useful on **high speeds** where the volume used is high. Should too great a volume be introduced against the strap where the shake is strongest on high speed, the back

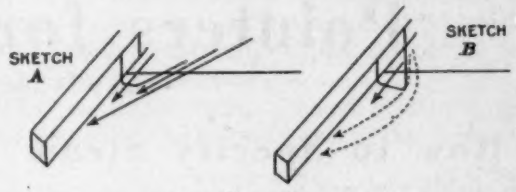


Figure 48

lash would be greater and the edge thinned. By rounding the edge of the corner piece as shown, the volume is brought into contact with the strap lower down the wire.

Until recent years, it was the practice to set the first slice where it would deliver over the center of the first tube roll, and if two slices were used, the second slice delivered over the second tube roll. With this arrangement, the **pond** was supported by the breast roll and wire.

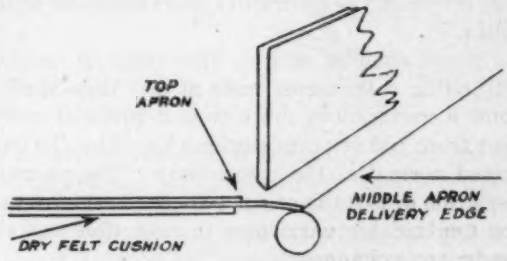


Figure 49—The Apron Set

Usually the three-apron set was used. This consists of a bottom cushion of dry felt, lying on the wire with its edge parallel with and directly behind the inner edge of the first slice. The middle apron is set under the slice with its delivery edge on the center of the tube roll. The top apron is set one inch behind the inner edge of the slice. The reason for setting this top apron back is to help check the wire flow which is faster than the slice flow.

Sometimes when making a heavy sheet with the single apron set right up to the slice, bars will be clearly seen across the width of the sheet. This is caused by the flow from the head box on a horizontal plane with the wire being faster than the flow delivered from the slice edge. Setting the apron back an inch will permit the bottom flow to come in contact with the wire before the slice flow is released, thus making their speed more nearly equal and eliminating the barring from the sheet.

The whole question of **control** of the liquid volume **to and on** the wire cannot be given too much attention. Whatever the distribution of fiber is when it ceases to be in suspension is the **only** distribution we are

going to get. If a good, evenly woven sheet is delivered from the wire to the first felt, then we have a chance to combat any other difficulty the machine may present. If we leave the wire with a poor sheet of paper, then even ideal conditions on the rest of the machine will not make it a good one.

Keep the fiber in suspension until it is woven into a homogeneous sheet, is the slogan for liquid control.

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

How to Specify Steam

SPECIFICATIONS have been written for nearly everything. The last to join that class is our much used friend, "Steam." A prominent concern has prepared a "Standard Specification" for steam, as follows, to insure clean and dry steam:

"Steam shall be entirely free from all solids—both soluble and insoluble. Samples of condensed steam shall not show more than nine parts total solids per million, which is the tolerance to cover dissolved copper and iron from the test condenser, unavoidable dust contamination during the collection of the sample and its evaporation and unavoidable errors in the laboratory determination of total solids.

"Steam shall be entirely free from all moisture. Throttling calorimeter tests at any time shall not show a variation of more than 2-10ths of one per cent from 100 per cent dryness based on the determined normal of the calorimeter. The permitted variation of 2-10ths of one per cent is the tolerance for unavoidable variations in radiation and thermodynamic changes."

To some users of steam it might seem that specifications are unnecessary—that "steam is steam," and that specifications can't make it any different. But not so. An instance is cited where a prominent paper company decided to adopt standard specification steam and as a result they are now saving nearly $6,000 per year. There is a saving in fuel due to increase in superheat and reduced blowdowns; the 2,600 kw. turbines needn't be cleaned so often, if at all, thereby creating a saving of over $2,000; an important saving in packing rings and labor replacing the rings on the Corliss engine; and a saving of over $200 that would otherwise be spent for cleaning the governors on ten variable speed paper machine engines. That being the case, clean and dry steam is surely worth seeking and having.

Dust as a Fuel Possibility

THE Department of Agriculture recently caused considerable speculation and comment by operating an automobile engine on grain dust. Although it operated very feebly the event is heralded by some papers as "epoch making." One paper asks, in a humorous vein I presume: "Can one hope that some day a few minutes' use of the vacuum cleaner will furnish the fuel needed to make the week-end trip in the flivver?"

Probably in a few isolated instances it will some day be possible to economically ultilize dust as an explosive fuel, but I have my grave doubts.

It is true that dust explodes and that with each explosion force is exerted and some power is available. The force is considerable, too, in a few cases, as with flour dust, coal dust, grain dust, etc., but nevertheless the natural supply of dust, even in the "dusty industries," is very small, and hardly sufficient for serious power consideration. The only possibility of dust utilization, as I see it, would require the grinding of grain, starch, sugar, etc., into very small dust particles and then utilizing it in the same way that Diesel tried to use coal dust in his engine.

It is commonly believed that a pound of gun-powder or a pound of nitro-glycerine, or TNT, contains more energy than a pound of coal, but not so. A pound of coal contains more energy than a pound of any of the high explosives.

The same is true of grain dust—a pound of grain dust contains less energy than a pound of coal or a pound of oil. Therefore by using dust we are not getting something for nothing.

How to Test Boilers

I HAVE just finished reading an interesting article on the testing of welded boiler drums as performed in Germany. They don't merely test up to the boiler pressure, nor to twice the boiler pressure, but they test hydrostatically to a pressure two and three times higher than working pressure. In other words, if the boiler pressure is 600 pounds, the hydrostatic test is carried up to 1800 or 2400 pounds per square inch.

This is exceedingly cautious and commendable testing, of course. It creates stresses higher than the elastic limit of the metal and naturally creates internal stresses in the metal. To relieve this strain, the drum is heated and annealed after the test.

After such a severe test as this, the user can be pretty certain that the boiler is safe under a working pressure of only one-third or one-fourth the test pressure.

This writer's opinion is that autogenously welded boilers or drums will not withstand this severe testing process whereas forge-welded drums and boilers

are better adapted to it. Anyway, the A.S.M.E. Boiler Code does not yet permit the use of any kind of welded boiler, whether forge or autogenously welded. It is good practice to always be on the safe side.

Verticalator

THE name "elevator" is objectionable to some people because it does not include the downward movement. Elevators not only elevate—they also lower people, boxes, packages, castings, etc. I am told that in England, the world "lift" is used instead of elevator. But the same criticism applies to the English term. It is almost as ridiculous to say to a person, "Take the elevator down", as it would be to say to him, "Watch out, or the pulmotor will kill you."

A prominent concern in the United States advertises that its business is "vertical transportation." Very good. You can't criticize that expression because it takes care of both directions—up and down. My suggestion is, then, that instead of "elevator" or "lift" we use the name "verticalator."

World's Deepest Well

IT IS reported that the Chanslor-Canfield Midway Oil Company soon expects to drill a well to a depth of nearly two miles—10,000 feet. They already have a well (Olinda No. 96) which is 8,046 ft. deep and they propose to continue it until it is 10,000 ft. deep. The present well is already the world's deepest.

Authorities state that the venture may not succeed because at these great depths tremendous difficulties are encountered. Thus, if by chance the drill should twist off, the task of fishing it out would be unprecedently difficult.

Even if the well is drilled to a depth of two miles, geologists state that it is not likely that the company will ever succeed in making the well produce oil. It apparently is not a business venture but is more of a sporting proposition.

At the bottom of the 8,046 ft. well, they have already reached a temperature of 233 degrees Fahr. which is 21 degrees higher than the boiling point. With each 50 feet of depth the temperature increases one degree Fahrenheit. At that rate the temperature at a depth of 10,000 ft. would be about 273 degrees Fahr. or equivalent to a steam pressure of 29 lb. per sq. in.

Why not utilize that heat and make the well dig itself after reaching a temperature high enough to generate steam? It probably can be done.

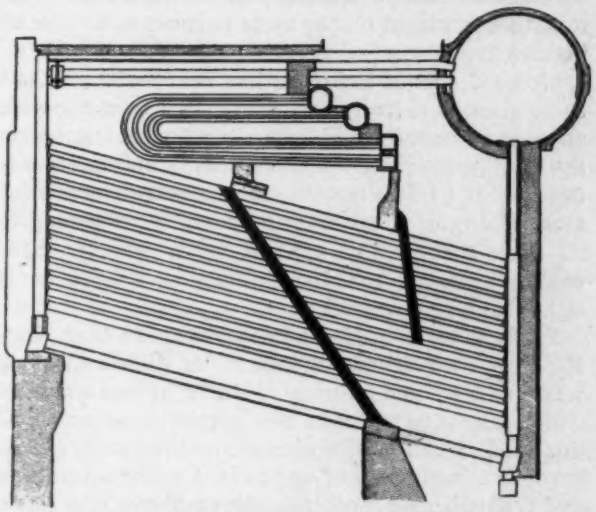
Boiler Baffles

BOILER baffle walls have been so much improved during the past 15 years that at the present time they are certainly much closer to perfection than ever before.

One of the things that combustion engineers have been striving for is the positive expansion joint. Such a joint has now become an actuality by the employment of a corrugated sheet metal separator between layers of plastic refractory.

One of the objections to tiling is that the thickness of the tiling often prohibits the making of a perfect wall. The thin refractory is so weak that when subjected to the shocks of a vibratory or rotary cleaner, small chunks of the material fall out of the wall, thereby causing gas leakage.

Solid monolithic walls, although perfectly tight when new, soon show cracks due to the uneven expansion and contraction of the boiler tubes, and when they are cracked and broken they naturally are not gas tight.



Although a baffle is a very simple part of a boiler, it is nevertheless of great importance. Baffles should be correctly designed, correctly placed in the boiler tubes, and they should be absolutely leakless. Tests have proven that baffles should not be placed haphazard here and there if high efficiency is wanted. The volume and velocity of the hottest gases determine the position of the first baffle. Then, as the gases reduce in volume and give up heat, due to coming in contact with the cooler tubes, it is obvious that the second baffle should be so placed that there will be no reduction in gas velocity. And so on. As the gas moves from pass to pass, the baffles are placed closer and closer together. In most modern boilers they are placed angularly as well as gradually closer. The longitudinal view herewith shows correctly designed baffle walls.

If the baffles should leak at any time because of loose particles of refractory or careless construction, the hot gases will "short cut" through the baffle and escape up the chimney without giving off the full amount of heat. The chimney gases will then be too hot. Baffles that are in a tumble-down condition should be replaced with new, modern, leakless baffles, having ability to take care of all expansion and contraction and tube renewal stresses.

Editorial Comment

By WILLIAM SIBLEY

Edison and His Questionnaires

IN AN authorized interview with Mr. Edison, recently published in The Forum, Mr. Edison, the outstanding inventive genius of all time, makes interesting comment on the basic purpose and value of his now famous questionnaires. Mr. Edison said:

"A good deal of nonsense has been written about those questionnaires. Any man who is working with any sort of material and depending for his success on the intelligence with which he selects and handles it is stupid if he does not use every possible means for ascertaining as many facts as possible pertaining to it. Mere looking at a young man who is applying for employment can tell you nothing save that he is either high or low grade.

"An employer needs to know far more than that. He must have certain details if he wishes to avoid waste of time and effort in training human material which cannot be trained. The human mind cannot be analyzed as can be the piece of metal, but it can be predetermined whether or not it is really a thinking and remembering machine. An employer who has a good memory will be of far greater value than one who has not.

"But the questionnaires were more than a memory test. Framed with the object of bringing out many things of value which were not apparent to the man who examined them casually they rendered me good service. Mental capacity, attentiveness, quickness and accuracy, or their opposites, may be indicated in the answers to a questionnaire and, further, it is possible to devise a list of queries which will draw out of the person answering them much evidence as to character in its various manifestations. Just why there should have been so much excitement because I, an employer, decided to use questionnaires in an effort to determine whether or not applicants for positions were fit to fill them has always puzzled me. Every school and college in the world depends upon examinations as virtually its only means of establishing pupils' fitness or unfitness for promotion. And what, may I ask, is a college? An institute of learning. What is a business? An institute of learning. Life, itself, is an institute of learning.

"Business is a college more exacting than any school or university. Its courses are strictly practical and its teachers are 'hard boiled', but it is a school, a college or a university, in accordance with the student's individual ability. Its courses are not always free. For some of the instruction all of us pay a very high tuition. Only to a certain extent are they elective. That only a small percentage of the young men adapt themselves effectively to the business courses they choose and pass their examinations for promotion, is sufficient indication that our system of general preparation is far from ideal.

"There was nothing in the results of my questionnaires to discourage me about modern youth, although there was perhaps something in the current comment to discourage me with regard to modern maturity. If my questionnaires revealed to me any details of inefficiency then they served a good purpose. They were devised with the idea that they might increase my own efficiency as the head of a business enterprise, for the first requisite of business success is ability to select intelligently the people to be employed."

Since Grandfather Was a Boy

PLATO penned his dialogues 400 years before the dawn of Christianity—by the unsteady flicker of a tallow dip. Over 1900 years later, Martin Luther nailed to the church door his famous theses which had been laboriously enscribed with the assistance of the same sort of illumination. Our own John Marshall, greatest of all chief justices, wrote his opinions by the light of an oil lamp. Few grandfathers of today studied their school lessons by an illuminating medium better than the coal-oil lamp. Even the cheapest of articles are today written, swiftly and accurately, on typing machines and in rooms where dusk has been dispelled by the glow of incandescent bulbs.

The industrial achievements wrought within the span of a single life time more profoundly affect human welfare than the combined industrial developments from the age of Confucius to the year 1800 A. D. Within the span of two lives may be written our history as a nation—the nation that has contributed the great bulk of recent industrial achievements.

Our grandfathers were born to a world that had seen little change with the passing centuries. Their transportation was horse and ox on land; sail and oar on water. For the most part the clothes to be worn were made in the home. Books were treasures not to be had for the asking. Little of importance in the way of industrial development antidates the war of 1812. Long years after Massachusetts became a sovereign state, there remained in her statutes a law prohibiting citizens from bathing during the months of December, January, February and March. Some

—— on Timely Subjects

years after the constitution of the United States was promulgated, Lavoisier died on the guillotine at Paris because the then president of the committee on public safety had said the Republic needed no scientists.

The fallacy of these doctrines has become evident only during the past 125 years—more especially within the last 75 years. That industry which survives and advances must recognize and employ science in its every form. If humanity is to progress, such advancement can come only through enlarged use of engineering and science.

February 22nd

WASHINGTON'S birthday (George, not Booker) is observed and celebrated in all but the 49th state. On this day we are given our annual view of George chopping the cherry tree, breaking up the Delaware ice trust, and Mt. Vernon on a particularly busy day. In public schools the teacher's pet is accorded the privilege of reciting "Farewell to the Army," after which the entire class sings "Columbia, the Jam of the Ocean."

World War Industrial Cost

WORTHY statisticians say that the shortage in international trade because of the World War amounts to $200,000,000,000. This is the total value of merchandise exports which would have been added to international trade had there been no World War and is based on reliable figures from 70 nations which do more than 90 per cent of the world's business.

Only last year, it seems, did the world get back to the 1913 basis. The nations under discussion had an export trade of $19,426,000,000 in 1913. Last year the total was nearly 30 billions, but at the 1913 buying power this amounts to only 20 billions, or just slightly in excess of the 1913 figure.

"The amount of world trade there would have been if there had been no war," the report says, "was reckoned by the rate of advance from 1900 to 1913, which amounted to 6½ per cent annually. To meet the setback caused by the war, world trade has now accelerated in pace, and for the last three years the advance has been more than 10 per cent annually. But even at this rate, it will take 30 years to make up for what has been lost."

"Even this country, which has gained almost 32 per cent in real exports since 1913, and has made the greatest gain of all nations in volume of trade acquired, is still more than $2,000,000,000 behind the export trade it would have had if the pre-war gain had been uninterrupted."

Insulation Saves Dollars

BECAUSE metal piping quickly assumes the temperature of the fluid or vapor within it, it must be apparent that when pipes are bare there is an immense amount of heat radiated to the surrounding atmosphere. Although this is not always a total loss, since such heat is frequently welcomed by the rooms through which the pipes pass, there is an annual loss running into millions of dollars from this source. Covering the pipes with some good insulating material will usually earn its cost within the first season. This fact is well recognized by power plant engineers, with the result that high pressure steam pipes are almost always covered. Such universal recognition cannot be carried to the mill superintendent, however, for in many plants naked pipes are very much in evidence, as would be the cost of such nudity if calculated.

The amount of heat lost through bare iron pipe is enormous and rarely appreciated by mill owners or superintendents. It varies from 53 cents per 100 lineal feet of ½-inch pipe at 120 degrees F. to $76.50 per 100 lineal feet of 18-inch pipe at 350 degrees F. Under high temperature conditions, proper insulation will frequently pay for itself in one month. Take, for instance, a 1½-inch pipe carrying steam at 220 degrees through a room that has been heated to 70 degrees. The heat loss per lineal foot of bare pipe per hour is 197 heat units. If the pipe were wrapped with a one-inch layer of any of the better grades of insulators, the saving per hour in heat units per lineal foot would be 143.3. Assuming that the useful heat generated costs 60 cents per million heat units the saving per lineal foot in six months would be $0.377, while the cost of the covering would be about $0.165 per lineal foot.

There are three general types of commercial insulation available which may be successfully used to insulate low and medium pressure steam lines. The corrugated type consists of alternate layers of plain and corrugated asbestos paper wound around a mandrel and firmly bound together. Then there is the moulded variety wherein 85 per cent magnesia is moulded from a mix with 15 per cent asbestos. The third is known as laminated and consists of layers of asbestos paper firmly bound together, each successive layer being separated by means of small indentations or tiny quantities of spongy material. Where needed, any one of these accepted types will more than justify its cost and earn its keep.

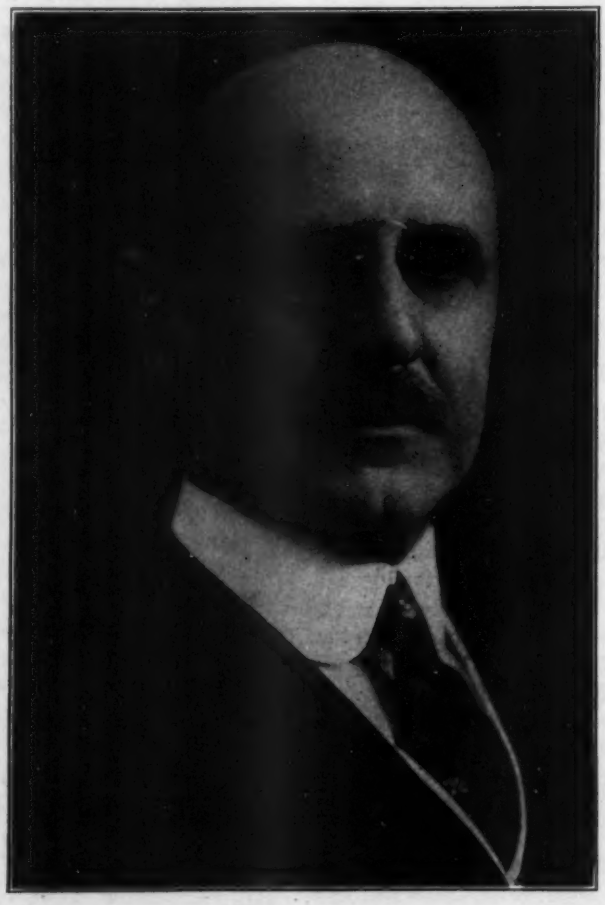
Canadian Association's Annual Meeting

Well Attended Sessions of Technical Section Marked by Papers and Discussions of Power and Papermaking Problems

DURING the four days of January 25, 26, 27 and 28, 1927, the Canadian Pulp and Paper Association held meetings at the offices of the association in the Drummond Building, Montreal, and at the Ritz-Carlton Hotel. There were meetings of the Book and Writing Section and of the Executive Council in the morning and afternoon of Tuesday, but after that the various meetings of the different sections of the association took place at the Ritz-Carlton, though the annual cabaret dinner of the Technical Section was held at the Mount Royal Hotel.

Engineering Topics Predominate

Under the chairmanship of Herbert O. Keay, formerly professor of mechanical engineering as well as of transportation at McGill University, and now resident consulting engineer of the Laurentide Company at Grand Mère, P. Q., the Technical Section met on Wednesday morning, Jan. 26, in the ball room of the hotel and listened to papers and discussions of considerable engineering and chemical value; in fact, the sessions took on a distinctively engineering aspect. Among the outstanding features of the interesting series of meetings conducted by Professor Keay were papers on factors in drying problems which shed new light on the mechanism of drying porous sheet materials, with specific reference to paper products; form and construction of steam generating units, with observations on the difference in cost between pulverized coal and stokers, which was not believed to be great, though opinions differed on this. In power plant work automatic combustion control was advocated as superior to hand control and the importance of air regulation was emphasized, the prodigal use of air being declared to be as great if not a greater error than a too free use of fuel. In discussions on purely papermaking problems, interesting observations were made on the part played in papermaking by the rosin of the wood, in its appearance as pitch on the wire and pressrolls of the fourdrinier, brought forth a good discussion. It will be seen that the meeting was a worthwhile one that justified an unusually large attendance of power plant and pulp and paper engineers and chemists as well as practical pulp and paper manufacturers from all parts of Canada and some parts of the United States.



President L. R. Wilson

After Secretary Edward Beck had read the minutes of the preceding annual meeting, Chairman Keay said he would present his annual address as read, this being already in printed form for submission at the annual meeting of the general association later on. He referred to the meeting held in Montreal in conjunction with the Dominion Convention of Chemists under the auspices of the Society of Chemical Industry, the Canadian Institute of Chemistry and the Technical Section of the Canadian Pulp and Paper Association, at which the papers and discussions were of unusual interest to all who employ cellulose as a raw material in manufacture.

Work of Committees

Chairman Keay touched on the work of the several committees of the section. The Committee on Chemical and Physical Standards had revised the standard test for the strength of unbeaten pulp. The Committee on Wood Measurement had studied the relationship between the specific gravity and the age and number of annual rings per inch in sound spruce and balsam fir with a view of determining a constant to be used in converting volume measurements to weight. He called attention to the work of the Committee on Education, the report of which would be presented later, saying that the industry should co-ordinate educational work in the mills by each mill appointing a committee to assist in the formation of groups of men for study. Speaking of membership accessions, Chairman Keay said that while the total membership had been well sustained, twenty-three new members having been added to the section to the past year, it was felt that more encouragement to join the Technical Section might profitably be given by mill executives to the technical men in their employment, so that an even greater membership would result.

Association to Build Research Laboratory

President L. R. Wilson of the parent association sent a message to the Technical Section which was read by Chairman Keay in which he touched on the research work to be conducted by the association when the new laboratory is built on the campus of McGill University. The new building will provide quarters for scientific research in the interest of the Canadian pulp and paper industry and will be the headquarters of the Canadian Pulp and Paper Association. Among the problems of the industry awaiting solution which will be taken up in the new laboratory mention was made of the recovery of by-products from waste sulphite liquor; utilization of raw cellulose material not heretofore used; improvements in cooking processes to increase the yield of pulp; changing of the colloidal character of pulp so that water can be removed with more mechanical power and less heat; heat utilization and greater developments in by-products.

Finances of the Section

Secretary Beck reported on the financial position of the section. The income from all sources during the year amounted to $2,158.87 and expenditures $1,520.17, leaving a balance of $638.70, which was a slightly better showing than that reported last year.

The Conduct of Mill Education

Under reports of standing committees, T. Linsey Crossley reported for the Education Committee in a statement of considerable length which embodied two recommendations, one that each mill appoint a responsible small committee on educational matters and the other that the association have one committee only on educational matters, with sub-committees as required.

Suggestions were made for the conduct of mill education courses in mills that have not yet developed courses of study. It was recommended to appoint an individual or a small committee to ascertain what men were taking courses on their own initiative, the courses available and what men would be interested. The use of facilities provided by local schools should not be overlooked; a place and conveniences for study should be provided and the students organized into groups with more advanced correspondence courses and classes for elementary subjects.

The committee was of opinion that mill education would be best conducted by groups of individuals meeting periodically for discussion and counsel rather than by classes with definite assignments. Correspondence courses were favored, though no actual preference was expressed for either class or correspondence study, it being felt that an endeavor should be made to use each in the case for which it was best fitted.

School and University Work—The committee reported on work done in universities, the Institute of Industrial Arts, extension or correspondence courses in universities and the Quebec government school at Three Rivers. With reference to work done in paper mills, mention was made of the Lincoln Paper Mills at Merritton, Ont.; at the P. H. Glatfelter Company's mill at Spring Grove, Pa., and the classes of the Champion Fibre Company at Canton, N. C.

Courses in pulp and paper are given at McGill University, Montreal, and the University of Toronto. The inauguration of a chair of cellulose chemistry at McGill University, occupied by Dr. Harold Hibbert, was said to mark an era in the scientific development of the paper and allied industries in Canada. The work of the New York State College of Forestry at Syracuse University, which has about sixty men enrolled in its pulp and paper course, came in for mention, as well as similar work at the University of Maine, referred to as, "the pioneer college in America in this subject." The Institute of Industrial Arts had an enrollment of 899 students at the end of December, 1926, and this with thirty-five graduate students gave a total of 934. This school depends for its maintenance on the collection of fees from students and detailed financial information in the operation of the school has been filed with the Canadian Pulp and Paper Association.

The correspondence courses carried on for the Wisconsin State University Extension Department by the Forest Products Laboratory at Madison were touched upon. At present these deal with the subjects covered by volumes III and IV of the industry's textbooks.

Courses have been organized in several mill towns by the Massachusetts Board of University Extension, the work, including both classes and correspondence studies, being under the direction of Dr. James Moyer. Martin L. Griffin is in this way conducting a course of eight lessons in papermaking at Holyoke.

Revision of Textbooks—After a reference to the work of the School of Papermaking at Three Rivers, Que., under the auspices of the Department of Forests of the Province of Quebec, a report on the revision of textbooks was submitted. Volumes III, IV and V are to be revised and rearranged, and arrangements have been made for a complete translation in French with the co-operation of the School of Papermaking at Grenoble, France. The first two volumes and parts of the third and fourth have been already translated.

Mechanics Ahead of Mentality—The interesting observation was made that the gist of the problem confronting the Committee on Education was that in an appreciable degree the mechanical equipment of the industry had outstripped its mental development. The highest intelligence in engineering and design was now being applied to industry, but in many cases, the operation is in the hands of men whose background is fifteen years back, who have neither the opportunity to study basic principles nor any strong incentive to do so. However, what was referred to as a change from paternal to fraternal attitude in industry was exerting an influence, as the employees of many companies today include a notable proportion of its shareholders, so that there was much more of mutual interest between administration and operation and it was more practicable today to start and carry on programs including safety and education than it was ten years ago.

Suggestive Editorial in Labor Paper—Mr. Crossley quoted from an editorial appearing in the quarterly issue of the Paper Makers' Journal, the organ of the International Brotherhood of Papermakers, for December, 1926, which read as follows:

"The whole art of papermaking has advanced, not alone by improved mechanical methods but also by eliminating all element of guess work by scientific methods, which is the result of the employment of men versed in the knowledge of many arts. Practical men, there always will be, to be sure, but they will not be advanced beyond machine tenders or boss machine tenders We have now reached the stage where each man is good only on the position he occupies. He certainly does not have opportunity, in a practical way, to learn all about the whole science of the paper industry.

"If practical experience cannot give us the qualifications necessary to encompass the whole science of making paper from the first process to the last, which is marketing the same, then it is necessary for us to take up the trade from its technical requirements. How is this to be done? It will have to be done through study classes. This, of course, will require that we give some of our spare time to study. Be that as it may, if we wish to go forward to higher positions in the industry, we have got to in some manner gain this technical knowledge. Those who come into the trade through the research and executive departments have not the same favorable opportunity to learn every detail of the art of manufacturing paper, as have the men who start in as apprentices on the paper machines, and work up after years of experience with the peculiarities of numerous mechanical operations in the process of forming the furnish into a sheet of paper and into a finished product for shipment.

"If we combine our advantage in this respect with the advantage procured through technical education, there is no reason why men who come in at the bottom cannot attain the highest position the trade or industry has to offer. This in the opinion of the writer, is the only sure way to advance our interests."

The report of the Education Committee, which bore the signatures of George Carruthers, A. P. Costigane, C. Nelson Gain and J. N. Stephenson, as well as that of the chairman, contained as appendixes reports of the educational classes of the Champion Fibre Company, Canton, N. C., and copies of forms used on time cards issued to men taking the classes as sent in by J. Norman Spawn, educational director.

Funds of the Textbook Committee

At the request of Chairman Keay the report was discussed by R. S. Kellogg, secretary of the Joint Educational Committee, who gave some details of the sale of and income from textbooks. The total number of copies sold amounted to 14,512. As to finances, he reported a balance of $912.28 in the original textbook fund. Proceeds from royalties had been invested in 4½ per cent interest-bearing securities of $6,000 par value, purchased at $5,978.95, and there was a bank balance of $1,768.82, as of December 31, 1926.

George Carruthers joined in the discussion and emphasized the importance of the section having one committee only to deal with educational matters. The report was then formally adopted.

Strength Test for Unbeaten Pulp

G. B. Payne, of the Forest Products Laboratory, presented the report of the Committee on Chemical and Physical Standards in which was recommended the adoption of a revised

method for testing the strength of unbeaten pulp. Details of the revised method were given as follows:

Tests for Determining Strength of Unbeaten Pulp

1—DISINTEGRATION: The pulp sample to be tested shall be in a perfect state of disintegration, this having been accomplished in such a manner that no hydration or cutting of the fibers has taken place.

2—PREPARATION OF DISINTEGRATED PULP: The pulp shall be diluted to .5 percent consistency. The exact consistency must be determined in each case, so that the exact amount of fibers can be measured out for the test sheets.

3—AREA OF TEST SHEETS: The area of the test sheets shall not be less than 36 square inches and not more than 81 square inches.

4—WEIGHT OF TEST SHEETS: The test sheet shall have a weight equivalent to 125 pounds per ream, 500 sheets 25x40 inches, and must not vary in weight more than ± 3 pounds on this basis.

5—SHEET MAKING: The test sheets shall be made on a sheet machine. The screen shall be covered to a depth of about 4 inches with clear water. The volume of diluted stock, corresponding to the quantity of fibres required to make a sheet of the weight given, is poured in and the deckle box is filled with clear water to such a height that it will require 12 to 14 seconds from the time the discharge valve is opened until the water has left the sheet completely.

The sheet shall be made as follows: The suspension of fibers is mixed with the hand and no time is allowed for settling, the discharge valve, which must be a quick opening gate valve, being opened immediately on withdrawing the hand. The sheet shall be couched off on a damp felt and placed on another felt. Each sheet shall be placed evenly on the felt, covering the previously made sheet, and galvanized iron plates shall be placed on top and bottom of the stack.

A sufficient number of test sheets shall be made, so that a sufficient number of determinations can be made to insure an accurate average of each strength property desired.

6—PRESSING: The sheets shall be pressed between the felts for 30 seconds at 40 pounds per square inch of sheet area.

The sheets shall then be removed and pressed between dry and cool blotters. Eight blotters shall be used for each test sheet. The pressure shall be raised to 200 pounds per square inch of sheet area and allowed to remain for exactly 5 minutes. The test sheets shall then be transferred to dry blotters, four for each sheet, and again pressed, raising the pressure to 200 pounds per square inch of sheet area and leaving for two minutes.

7—DRYING: The pressed sheets shall be dried at 65 per cent relative humidity and 70° F. temperature.

8—WEIGHING OF TEST SHEETS: The sheets shall be weighed on a scale having a sensitiveness of 10 mgr. per 50 grams. The weight shall be expressed in grams and hundredths of grams and then recalculated in pounds per ream.

9—TESTING OF SHEETS: The sheets shall be tested for strength properties at 65 percent relative humidity and 70° F. temperature on instruments recognized as standard.

10—COMPUTATION OF RESULTS: All tests shall be reported in per cent points per pound base weight.

For disintegrating pulp, the Dazy churn disintegrator was said to be superior to any other form of apparatus.

Adoption of the report was strongly recommended in short talks by several members. W. G. MacNaughton said the proposed standard was identical with that used by T. A. P. P. I. and the American Society for Testing Materials. John Traquair said it meant the adoption of a standard that would be used generally after adoption by the Canadian Association and the A. P. and P. A.

Mr. Traquair took occasion to put in a word for the use of a constant humidity room, the construction of which was not such a formidable affair as generally imagined. He had constructed a homemade apparatus at the mill laboratory in Chillicothe which worked satisfactorily.

In reference to methods of pressing the pulp, D. E. Cable spoke of the American method with small hydraulic presses as made by Watson-Stillman Company, of Aldene, N. J., and some discussion ensued regarding the right pressure to be applied per square inch, Doctor Cable favoring 500 lb. and E. P. Cameron, head of the paper and pulp section of the Canadian Forest Products Laboratories, 200 lb.; less than 200 lb. as advocated by some would, he said, be apt to result in variations.

Wood-Measurement Studies

Acting-Secretary Stephenson read the report of the Wood Measurement Committee, P. J. Murer, chairman, being absent. The report consisted largely of tables and graphs giving comparisons of differences in specific gravities and densities of woods grown in different districts, the conclusions of the committee with reference to factors affecting woood measurement being stated as follows:

1—While large individual variations occur in the density of pulpwood, we consider that the average figure for representative numbers of logs of one district and of the same species, will practically be a constant; and that, consequently, the conversion from weight to volume, and vice versa, by the use of a factor is possible.

2—For the same species of pulpwood, the average specific gravity factor in one district may differ from that of another district.

3—Up to the present, the tests made indicate that the density of balsam, for the same year ring width, is about 20 per cent less than that of spruce.

Our work has now reached a point from which, perhaps, much of it can better be passed on to the individual mills; but, inasmuch as a broad knowledge concerning pulpwood density is of great importance to the industry, we consider that before concluding our investigations, density tests should first be made at other, and more remote, mills, and the data incorporated with our present findings. Your committee also feels that a final report should be made, which would contain in one place, the information embodied in our various reports.

Abstracts of Pulp and Paper Literature

J. N. Stephenson, chairman of the Committee on Abstracts and Publications, submitted a report of progress, and in connection therewith brought up the question of publishing a ten-year volume of abstracts. The suggestion was made that the cost of such a volume might be reduced by using the Gestettner system of multigraphing. The report also contained a series of suggestions for the preparation of manuscripts by abstractors.

May Co-operate With T. A. P. P. I.—Inasmuch as Dr. C. J. West, chairman of the T. A. P. P. I. Committee on Abstracts, had been working on the publication of a twenty-five-year bibliography, it was suggested both by Doctor Hibbert and Mr. MacNaughton that the Canadian committee should consider co-operation with Doctor West in the production of a volume that could be sold for $10, and this seemed to be generally approved by the meeting.

The appointment of a Committee on Nominations was then announced by the chair, John S. Bates, Rex. W. Hovey and C. Nelson Gain being named. The question of appointing a representative of the Technical Section to serve on the Canadian Engineering Standards Committee came up and on motion Edward B. Wardle was recommended for reappointment.

For a Chair of Fuel Technology at McGill

At the suggestion of Chairman Keay, Leslie Thompson explained briefly a plan that was under consideration at McGill University for developing a department of fuel technology for undergraduate and postgraduate students, with evening extension courses. The plan was receiving the support of several basic industries and it was suggested to the pulp and paper industry that a small subvention be made to the university for the support of the new department. A number of large engineering and other coal-consuming industries had agreed to the principle of supporting the department, because they were aware of the value of diffusing an educated opinion concerning coal and giving students an introduction to fuel technology. Mr. Thompson explained the benefits that might be derived from the operation of such a department, mentioning among others the creation of a supply of trained men equipped to provide a trained personnel available for employment. The term subvention, therefore, might better be termed

investment. It was proposed to recommend to the parent association that a grant of $1,000 be made yearly for four years, which would be about one-tenth of the total expenditures necessary for the conduct of the department. Based on percentage of fuel consumption, the proposed grant would be for the paper industry only 15 per cent of the total expenditure in order of magnitude, and if all industries participated the total investment would be the equivalent of but half a cent per ton of fuel consumed.

Favors Grant to University—Finally, on motion of O. F. Bryant, the following resolution was adopted:

"Whereas, there is a movement on foot among the industries of Canada to establish a department of fuel technology at McGill University; be it resolved, the Technical Section recommends to the Canadian Pulp and Paper Association that an annual grant of $1,000, for a period of four years, be made to McGill University to assist in this development."

New Use for Lime Sludge

The reading of papers was then taken up and Dr. John S. Bates, who is now chief of the research department of Price Bros. & Co., Ltd., described a lime sludge process developed by him in the kraft and sulphite pulp mills of the Bathurst Company Ltd., Bathurst, N. B., which had been successfully operated on a commercial scale for more than two years. After describing the cooking liquor used in the kraft pulping process and the recovery methods employed, he touched on the improvements made possible by his process on which he has applied for patents. The two chief improvements consist (1) of a means of purifying the kraft green liquor by the removal of insoluble impurities to produce a purer lime sludge; and (2) the substitution of the purified lime sludge so obtained for the ordinary lime in a milk-of-lime system for making acid sulphite liquor in the sulphite pulp process.

Settling Process for Impurities—All the iron compounds are precipitated from the hot liquor by a settling process. After settling has started, the clear green liquor is drained from the top of the settling tank through a siphon tube and pumped to a caustic tank. The settling tank can be used for the treatment of six batches of raw green liquor, during a period of thirty-six hours, before the accumulation of dregs. A second settling tank is used for the next thirty-six hours, the first tank being held to recover the green liquor from the dregs. Only pure green liquor is used in the caustic tank in admixture with lime.

Lime Sludge to Replace Oxide Lime—In regard to the use of lime sludge in the sulphite pulp process, the well-washed sludge from the kraft caustic room is thinned with cold water, pumped to a storage tank equipped with agitators, and drawn off as required for use in the sulphite acid plant. After adjusting the thin sludge to the proper dilution, it is ready for feeding to the sulphur dioxide absorption apparatus in place of ordinary magnesium milk-of-lime, or in admixture therewith.

Advantages Described—Doctor Bates explained that the making of sulphite acid liquor involves the fixing of sulphur-dioxide gas from the sulphur burner in water solution with the help of a chemical base, u. ually calcium or magnesium in some form. He said there were decided advantages in operating a milk-of-lime system with carbonate sludge instead of oxide lime. Among these he mentioned that kraft lime-sludge cake mixed with cold water gave a cold milk-of-lime substitute that absorbed sulphur dioxide gas better; lime liberates much heat during slaking and the product is a milk-of-lime appreciably warmer than the temperature of the cold-water supply. Lime-sludge carbonate produces a rise in temperature of the raw acid in the sulphur dioxide absorption tower that amounts only to about half that which is experienced when the reaction takes place with the equivalent amount of hydroxide milk-of-lime. This difference of about 8° C. in favor of lime sludge permits better absorption of digester relief action and gas in the raw acid and allows more margin against losses of gas in warm weather, when the temperature is higher. The additional point was made that calcium carbonate as represented by the lime sludge when it comes in contact with sulphur dioxide changes readily from insoluble to soluble form in the calcium monosulphite stage, whereas calcium hydroxide in the magnesium milk-of-lime tends to form a precipitate of insoluble monosulphite which often plugs the holes in the tower plates. Being a waste product available at practically no cost, the lime sludge is more economical than magnesia lime, which costs usually from $10 to $15 a ton at the pulp mill, equivalent to a manufacturing cost of $1 to $2 per ton of sulphite pulp.

Chemicals Consumed in Pulp Manufacture—The author cited the usual quantities of chemicals employed in the production of a ton of pulp by the kraft process and the sulphite process respectively. Kraft pulp used up 400 lb. of salt cake and 500 lb. of calcium quicklime, the equivalent of 800 lb. of lime sludge, for every ton produced. Sulphite pulp used 200 lb. of magnesia lime, or 400 lb. limestone, or 400 lb. lime sludge (dry weight), per ton of pulp. Accordingly a kraft mill producing 100 tons of pulp a day would use about 25 tons of lime and produce about 40 tons, dry weight, of lime sludge. This, which would ordinarily be discharged to the river, if purified and used for acidmaking should be enough to operate a 200-ton sulphite pulp mill.

Doctor Bates said that any surplus lime sludge could be disposed of as high grade agricultural lime and the purification system of lime sludge was admirably adapted for preparing it for reburning in a rotary lime kiln for reuse in the caustic room.

After expressing the appreciation of the members for Doctor Bate's contribution to the proceedings, Chairman Keay adjourned the sitting for luncheon.

AFTERNOON SITTING, WEDNESDAY

Fundamental Factors in Drying

The reading of papers was resumed at the afternoon sitting which was convened at 3 o'clock. Dr. W. K. Lewis, of the department of chemical engineering, Massachusetts Institute of Technology, presented a lengthy paper on fundamental factors in problems of drying, with special reference to the drying of pulp sheets and similar products, in which he demonstrated the exceedingly complicated mechanism of drying operations and made it evident, as he remarked himself during the subsequent discussion of the paper, that the ideal system of drying has not yet been developed.

Three Methods of Drying—In a summary of his paper, he touched on the three most important ways of drying porous sheet materials by evaporation, which are: (1) simple exposure of the materials to unsaturated air; (2) heating the material by bringing one side of the sheet into contact with a solid heating element; and (3) a combination of these two methods.

In all three methods, the drying operation under constant drying conditions consists of three stages: first, a period of preheating, during which but little drying occurs; second, a period of drying at a rapid and substantially constant rate; and, finally, a period of drying at a rate decreasing rapidly as the moisture is driven out of the stock.

Principles of Drying—In the paper, which bore the names of Prof. W. H. McAdams and Dr. F. W. Adams as co-authors with Doctor Lewis, data were given to demonstrate that during the final stage of drying, under exposure to air alone at constant temperature, humidity, and velocity, the drying rate was proportional to the content of free moisture, and also to the humidity differences between stock and drying air.

Authors' Conclusions—These data show that during drying of this sort, the stock does not remain substantially at the wet-bulb temperature, even when quite wet, but rises somewhat above it at an early stage of the operation, and continues to increase in temperature throughout the drying process. The data also show that as drying progresses during this stage, both diffusional resistance to escape of water vapor from the stock and thermal resistnce to flow of heat into the stock, increase rapidly as the stock dries, but that the latter increases far more rapidly than the former.

During the final stage of drying, whether under conditions of exposure to air alone, or, as on drums, with alternate contact with the heating surface and exposure to air, so long as drying conditions are constant, the logarithm of the total moisture content of the stock is linear with the time up until a late stage in the drying operation. In consequence of this fact, the plotting of moisture content against time on semi-

logarithmic paper offers a most convenient engineering method of analyzing and interpreting drying data.

During the period of constant drying rate, high velocity of the air over the drying surface is an effective means of increasing drying rate and capacity of drying equipment. During the final stage of drying, at progressively decreasing rate as drying proceeds, high air velocity loses its efficacy in increasing rate; but decreasing sheet thickness becomes an important and valuable means of accomplishing the same result.

Best Method of Drying—The paper was discussed with evident interest by a number of members. A reply to a question regarding the most desirable method of drying with the drum system of dryers now used, Doctor Lewis said he would house the drums and apply a countercurrent of air.

Mr. Farnsworth, who took part in the discussion, considered it best to begin with a low temperature and come up gradually to full heat.

Heat Losses—Admitting that the question of paper drying was a very practical subject among papermakers, Doctor Lewis said it took certain amount of heat to evaporate a pound of water. The two major sources of loss of heat in drying were the heat put into air to heat the air, and loss by radiation.

J. N. Stephenson said that Doctor Lewis had done the industry a great service by giving a picture of what takes place when moisture is leaving the sheet of paper, and Chairman Keay thanked the author in behalf of the section for his contribution to the proceedings.

Air, Water and Steam in Dryers

L. D. Tatley, of the Laurentide Company, was next on the program with a paper on "Distribution of the Uncondensed Gases," which presented some novel ideas with regard to the mixing of air and steam in paper machine dryers, as he maintained that air does not mix with steam. Once it is in the dryers air escapes in a number of ways; some gets through the vents, and some through the thermic valves until the gas reaches the same temperature as the steam. There was a lot of heat transfer in a surface condenser in proportion to the amount of air in the steam.

Chairman Keay thanked Mr. Tatley for his paper, which he characterized as a most important contribution to the study of discharge of water and air from cylinders of paper drying machines.

Plastic Brick for Furnace Walls

At the close of the sitting, the Plibrico Jointless Firebrick Company, of Chicago, showed several reels of moving pictures depicting the building up of furnace walls with a plastic brick compound, which is said to be used in a number of Canadian soda and sulphate pulp mills.

THURSDAY'S SITTING

Artificial Grindstones

The sitting on Thursday morning, January 27, was opened with a paper by W. W. Greenwood, of the Norton Company's Research Laboratory, Worcester, Mass., on "Construction and Operation of a Segmental Pulp-Stone." The paper was illustrated with lantern slides showing the various details of construction, and from these and the author's talk it was easy to agree with Chairman Keay that the paper was descriptive of a long and difficult bit of research that would have daunted anybody lacking in the persistence and enthusiasm of the author. There were many difficulties to be overcome in the composition of abrasive combinations, as well as the matrix or bond of the stone, resulting from different grit combinations.

Composition of the Stone—The composition of the segmental Norton stone is crystolon, the brand name of a substance that is known chemically as silicon carbide. The characteristics of crystolon as an abrasive, apart from ability to withstand high temperatures, are hardness and brittleness. A long series of tests were conducted at different newsprint paper mills to determine the best composition for producing satisfactory news stock.

The stones are composed of segments assembled around a large drum or mandrel. Pictures of the stones and their metal frames or mandrels in all stages of construction were thrown on a screen, and these were followed by photomicrographs of groundwood fibers from Norton stones and ordinary sandstone. An interesting point was that in the mill from which the stock was obtained and shown on the screen, the Norton stone was installed in a grinder with scarcely any changes in the routine of handling stones. In another mill, where the production from four stones takes care of machine requirements, two of the stones were replaced with Norton stones over one week-end.

In many mills the same burrs are used with the Norton stone as are used with sandstones, and it was stated that a 10-cut spiral with 1¼-in. to 3-in. lead gives suitable news pulp with it, but it has been found better to burr the artificial stone more lightly than is customary with sandstone.

Consideration of Relative Cost—W. D. Mosher, of the Belgo-Canadian Company, discussed the paper at some length. He inquired regarding the cost of the Norton stone as compared with sandstone, but Mr. Greenwood said he was not informed regarding this; in fact, he had purposely refrained from getting particulars of this from the sales end, as he was aware that sales talk was not encouraged at these meetings. Mr. Mosher then made some calculations on the blackboard based on an original figure of cost for a segmental stone, which he put at $6,300 as against $1,100 for a sandstone. After paying 25 per cent duty and 5 per cent sales cost on the Norton stone, the total cost was increased to $8,168.75. Taking into consideration increased production over a longer period of years than a sandstone, the operating cost was figured at 27.2 cents per ton, which was considered reasonable; indeed, rather favorable to the Norton stone.

Mr. McLeod, groundwork superintendent of the Riverbend Mill of Price Brothers & Co., said that any quality of groundwood could be obtained from the artificial stone in the same way as from the natural stone and that the Norton stone at the present rate of wear would apparently last four years. It had been in use at the Riverbend mill for three months only. This practically closed the discussion and Mr. Greenwood was given a hearty vote of thanks for his paper.

Pitch on the Wire

The remainder of the forenoon sitting was taken up with the reading and discussion of a paper by Dr. John Campbell, of the Abitibi Power & Paper Company, on "Resins in Paper Making," the text of which appears on another page in this issue of THE PAPER INDUSTRY.

In opening the discussion on Doctor Campbell's paper, Chairman Keay said that pitch, like the poor, we had always with us, and any research looking to prevent its development should be welcome.

Mechanism of Pitch Preventives

Doctor Hibbert called attention to the fact that the author had used an acid as a dispersing medium, but his experiments with sulphonated oil were very enlightening. It was important to know the effect of reagents on colloidal dispersion and also something about the true composition of the substance that goes by the name of pitch.

Doctor Cable said he had played with the subject for several years, and the paper and discussion were therefore of great interest to him. There were a number of important things to be studied in the cooking of wood; it was well known that as the temperature of the acid increased, viscosity decreased, and he referred to Wolf and Moore's patent of 1914. If instead of using calcium bisulphite, sodium bisulphite is used, a selective chemical action is obtained that is not found with calcium bisulphite.

Commenting on the customary practice of adding alum to the beater contents in efforts to overcome pitch troubles, Mr. MacNaughton remarked that this caused excessive corrosion of many parts of the machinery.

Origin of Pitch

In reply to a query by T. Linsey Crossley as to the relative influence of sulphite pulp and groundwood pulp in causing pitch troubles, it was stated that sulphite was responsible for two-thirds of the trouble and groundwood one-third.

Some discussion ensued on the value of sodium thiosulphate and trisodium phosphate as pitch preventives, and it was explained that these salts acted as dispersive agents in the

process of being decomposed, acid being set free in the case of trisodium phosphate, with the subsequent formation of sodium bisulphite.

There was some discussion about definite means of determining the pitch on the wires and rolls as coming from either groundwood or sulphite, and Doctor Campbell said that it could be done by analyzing the pitch for sulphur and basing results on the amount found. In reference to another question, he said that there were more slivers to be found on the top of a newsprint sheet than on the bottom and it was because of this that the top and bottom of a sheet could be distinguished. This followed a statement regarding the character of the pitch found on the bottom and top rolls of the fourdrinier machine.

The thanks of the section were tendered the author of the paper for his interesting contribution to the proceedings, after which the sitting was adjourned for luncheon, which was a joint gathering of the Technical and Woodlands Sections in the grill room of the Ritz-Carlton Hotel, the special speaker being B. K. Sandwell, of the *Montreal Financial Times*. The luncheon was greatly enjoyed by a crowd that taxed the capacity of the grill room.

THURSDAY AFTERNOON'S SITTING

As it was 2:40 p. m. when Mr. Sandwell began to speak downstairs under an agreement with Secretary Beck that he would conclude his speech at 2 P. M. so as to let the members return to more serious business, it can be readily understood that the afternoon sitting was late in opening. As a matter of fact, it was half-past 3 o'clock when Chairman Keay called on John Blizard, research engineer of the Power Specialty Co., New York, to deliver his paper on "Steam Generating Units."

Selection of Steam Generating Units

Mr. Blizard's paper was a discussion of factors used in determining the selection of and expenditure necessary upon a steam generating unit with regard to the duty required of it. The principles bearing on design involved an estimation of heat losses and the overall efficiency of the plant. He spoke of savings effected by the use of an economizer, a saving amounting to about 10 per cent of the heat in the fuel being charged to one plant. Air heaters had the advantage over economizers of having air enter the air heater at a temperature lower than that at which the water entered the economizer, though if the air heaters were made large, the air was heated to a temperature greater than that to which water was heated in an economizer, and the temperature head between the gas and air then became less than the temperature head between the gas and water in an economizer.

Main Heat Losses.—He also discussed the carrying away of heat in the gas by means of the latent heat of the steam in it, and other sources of heat losses such as those from unburned combustible gases. There was, for instance, a loss of heat from solid combustible being carried away either as cinders up the stack or as combustible in the ash and refuse. The loss of combustible was said to be greater with stokers than with pulverized coal installations, though in the latter case there was apt to be a loss of solid combustible through particles of carbonized coal being swept out of the furnace with the furnace gases.

The third main heat loss was referred to as having its origin in convection and radiation from the outer walls of the steam generating unit, and he gave figures for radiation losses as 2 to 2¼ per cent for 200 per cent rating and 1 to 1½ per cent at 300 per cent rating.

Efficiency Depends on Low Losses.—The conclusion was that if sensible heat losses were to be kept low, the CO_2 must be kept as high as possible, though this might involve the risk of trouble from the erosion of brick walls and a possible loss of heat through combustible gases or carbon leaving the furnace unburned, so that it would probably be better practice to run CO_2 at 14 per cent than to take the risk of incomplete combustion with a higher CO_2.

Pulverized Coal vs. Stokers.—Mr. Blizard said that perhaps the most important consideration before the purchaser of a steam generating unit was the choice between pulverized coal and stokers. If pulverized coal is chosen he must decide on the use of the unit system or the central system. The first cost of the latter system is greater than the former, but the difference in cost between pulverized coal and stokers was not really great.

Dissenting Views

F. S. B. Heward, who discussed the paper, did not agree with the author in his statement concerning the difference in cost between pulverized coal and stokers, particularly as it was unsupported by any definite illustration. He was of opinion that when all the items entering into the overall cost of a pulverized fuel installation was taken into account it would be found that the stoker-fired plant was less expensive. Neither did he believe that it was possible to maintain a higher thermal efficiency with pulverized coal than with stokers.

Walter F. Keenan, Jr., joined in the discussion and gave it as his opinion that the furnace was the neck of the bottle insofar as capacity was concerned; that water walls were better than brick walls, and the addition of an economizer an improvement over an air heater.

George D. Bearce gave an account of the Edison Central Power Plant in New York which he regarded as one of the most modern steam generating units in operation. He also favored the stoker-fired plant over the pulverized coal system.

Control of Combustion

Lieut.-Col. James Mess, of the Dominion Flow Meter Company, Toronto, was then asked to present his paper on "Combustion Control." This was a very comprehensive study of the subject, copiously illustrated with lantern slides of efficiency curves and apparatus. He advocated an intelligent application of automatic combustion control equipment, and said that the rating at which maximum efficiency is recorded with the stoker-fired plant was about 150 per cent of rating, and that if economizers were used, the most efficient will probably be somewhat higher than 150 per cent.

Lieut.-Col. Mess's conclusion was that "in securing efficient increases in the power plant with automatic control over hand control, returns will be obtained far in excess of any other form of investment that may be considered."

Automatic Control Apparatus Favored

Chairman Keay said he was indebted to the author for a very instructive paper, and like most things he didn't understand, he had a wholesome respect for them, a state of mind which was shared by others in the audience.

There was only a brief discussion of the paper, Messrs. Bearce and Smith taking part. The consensus was that it takes an expert fireman to handle a furnace, and automatic control apparatus was generally favored, Mr. Smith saying we would err if we did not give the matter very earnest and serious consideration.

The last paper on the program, that on "Solubilities of Sulphur Dioxide," by W. B. Campbell, of the Forest Product Laboratories of Canada, was read by title, though Mr. Campbell was present and did give an outline of the work he had been engaged on which had led to the preparation of the paper.

New Officers Elected

The Committee on Nominations then reported the following list of names to be placed in nomination for officers to serve during the ensuing year.

Chairman—A. P. Costigane, secretary-engineer, Ontario Pulp and Papermakers' Safety Association, Toronto.

Vice-chairman—H. J. Buncke, Abitibi Power and Paper Company, Iroquois Falls, Ont.

Councillors—D. E. Reed, Brompton Pulp and Paper Company, Bromptonville, P. Q.; D. L. McLeod, Price Brothers & Co., Riverbend, P. Q.; H. O. Keay, Laurentide Co., Grand' Mère, P. Q.

The committee recommended that the office of vice-chairman be dispensed with in future and that the nominating committee be appointed months in advance instead of hours, as has been customary.

On motion, the chairman of the nominating committee was authorized to cast an affirmative ballot for the names proposed, which was done, and Mr. Costigane afterwards took the chair and acknowledged the honor of election as chairman of the section. The meeting was then adjourned.

Papers at Woodlands Section

The Woodlands Section held separate sittings, dealing with a number of papers on subjects of importance to the industry. Three papers dealing with the timber limits were presented. A. Graham, of the Quebec Forests Industries Association talked on "Practical Considerations in Calculating the Cut." H. L. Churchill, of Finch, Pruyn Company, Limited, had a paper on "Solving Problems in the Practical Handling of Freehold Timber Lands." W. G. Wright, of Price Bros., spoke on "Fire Protection by the Operator."

Meeting of the General Association

President Wilson Reviews Economic Situation and Counsels Prudence in New Commitments

PRESIDENT L. R. Wilson opened the annual meeting of the Canadian Pulp and Paper Association, in the vice-regal suite of the Ritz-Carlton Hotel, Montreal, on Friday morning, January 28. After a short speech of greeting, he asked Secretary Beck to read the minutes of the last annual meeting, which was accordingly done and the minutes adopted in the usual manner. On account of hoarseness, President Wilson had Mr. Beck read his annual message to the association, the essential portions of which are reproduced herewith.

President's Address

Mr. Wilson prefaced his address with a reference to the unusual activity and unprecedented expansion of the industry during 1926. The industry now represents a capital investment in excess of half a billion dollars, the annual value of its products amounting to $250,000,000 a year and its annual contribution to the foreign trade of the Dominion some $175,000,000, representing 17 per cent of the total exports of Canada.

Has Expansion Outrun Discretion?—Mr. Wilson said it might be, as some have feared, that with an annual output of 2,000,000 tons of newsprint a year the saturation point had been reached and the expansion of the industry had outrun discretion, so that precaution would be necessary to preserve an economic equilibrium during the next year or two. The dependence of the Canadian newsprint industry on business prosperity in the United States was a subject for serious contemplation. A lessened demand for Canadian newsprint might lead to a cut in price or a reduction in output, or both. Lower priced paper, however, would not help the situation. Consumers were satisfied with present prices and a cut would not materially increase the demand, but it would reduce the earnings of mills and this might be a serious matter for some, if carried too far.

Some Fear of Pulpwood Depletion—President Wilson regarded it as a hopeful and gratifying circumstance that the provincial government of Ontario and Quebec had become concerned about an assured supply of raw material for existing mills before encouraging the establishment of new plants. He said that this policy would have a tendency to stabilize the industry and would prove a step toward proper conservation of Canadian pulpwood reserves, which were by no means inexhaustible. Some emphasis was placed on the fact, as stated, that one-fifth of all the pulpwood harvested in Canada still found its way out of the country in an unmanufactured state. If a point had been reached where further expansion of the paper industry in Canada would be stopped for want of raw material, it would be inconsistent to permit an unrestricted drain upon the remaining supply to continue.

Felicitations for A. P. & P. A.—President Wilson called attention to the forthcoming golden jubilee of the American Paper and Pulp Association and said that a resolution would be introduced to extend the felicitations of the Canadian Pulp and Paper Association to the American Paper and Pulp Association upon their fiftieth anniversary.

Progress of Building Project—The movement for the erection of a research laboratory on the campus of McGill University which would also serve as general headquarters for the Canadian Pulp and Paper Association was a subject of comment by President Wilson who outlined the steps that had been taken by the special committee having this matter in charge. The sum required to carry out the undertaking is $350,000 and this amount had been subscribed in full by the members and by McGill University, the latter having agreed to take $50,000 of the bonds.

Development of Woodlands Section—After touching on the adoption of by-laws providing for appointment of a Committee on Resolutions and a Committee on Nominations, both to function in advance of the annual meeting each year, the work of the Research, Technical and Woodlands Sections of the association was commended. The Woodlands Section proposes to employ a Woods Department Executive who will give his entire time to problems of woods operations, and had asked for a financial contribution to enable them to carry on the work. As evidencing the need of improving present conditions it was stated that the total drain upon Canadian forests for the needs of the paper industry now approximates 5,000,000 cords annually, the product of 1,000,000 acres of land.

Joint International Committee—He spoke of the formation of a joint international committee to promote co-operation between the American Paper and Pulp Association and the Canadian Pulp and Paper Association as one of the gratifying accomplishments of the year. (The organization meeting of this committee was reported fully in THE PAPER INDUSTRY for January, 1927, on page 1729.) At the organization meeting, the American Section submitted such problems for consideration as Stream Purification in its Relation to the Paper Industry, the Saving of Mill Waste, Industrial Training and Education, Investigation of New Species of Woods for Producing Pulp, the Exchange of Statistical and Related Information, and Co-operation in Research and in Standardization and Simplification.

Trade Relations with Australia—Improved trade with Australia was noted in the president's address as a result of the Australian Trade Agreement. Canadian exports of paper to Australia for 1926 amounted to $2,874,777. In 1925, before the treaty came into full effect, the total exports amounted to $1,445,764.

Sunday Observance in Canada—In reference to a movement in some of the provinces to hamper operations of the pulp and paper industry by demanding a literal compliance with the Lord's Day Act, President Wilson said that this had been met in a spirit of conciliation and a willingness to comply with every reasonable demand. He considered that the authorities should bear in mind the peculiar nature of the paper industry, some branches of which necessitate continuous operations, and that Canadian plants were in competition with the paper manufacturers of the world, so that anything which might add to manufacturing costs or which would interfere with the regularity of shipments to other countries would work to Canada's disadvantage.

Felicitations were extended to the publishers of the Pulp and Paper Magazine of Canada upon their twenty-fifth anniversary.

Statistical Work—Losses by death and accessions to membership were reported and the address closed with a reference to the work of the statistical department of the association, which in addition to issuing reports to the number of forty to members each month on various subjects, has maintained contact with the various associations in Scandinavia, Finland, Germany and Great Britain. It is planned to establish an interchange of reports among the members of the Mechanical Pulp Section to cover various aspects of mill operations and suggestions and criticisms were invited.

Resources of the Association—Following the presentation of the president's address, the reports of sections were taken as read and Secretary-Treasurer Beck reported on the finances of the association, the resources of which were put at $78,597.48, of which $50,000 was invested in bonds at par value leaving a surplus for the year of $11,568.

Passage of Resolutions—Several resolutions were then submitted by the Executive Council for adoption. The first pertained to the approval of the formation of the Joint International Committee and this, on motion of Colonel Jones and Angus McLean, was adopted.

A. P. & P. A. Jubilee

The following resolution relating to the forthcoming anniversary celebration of the American Paper and Pulp Association was adopted unanimously, the motion being put by J. A. Bothwell:

"Whereas, Our sister organization in the United States, the

American Paper and Pulp Association, is on the eve of celebrating its fiftieth anniversary; and,

"Whereas, we recognize in the American Paper and Pulp Association a trade organization from which we have gathered much inspiration and one to which we are indebted for encouragement and assistance in the early days of our own association; be it, therefore,

"Resolved, That we place upon record our acknowledgment of such indebtedness and our appreciation of the harmony and goodwill which have always characterized our relationship, and which this year have resulted in the establishment of a Joint International Committee representing both associations; and that we hereby extend to the American Paper and Pulp Association our most cordial felicitations upon their Golden Jubilee and our most earnest desire that many more years of progress, prosperity and usefulness may follow."

Endowment of Research Laboratory—Several amendments to the by-laws were then proposed and acted upon, and a resolution pertaining to the incorporation of a company or association to build the proposed laboratory building in conjunction with McGill University was also adopted. This company or association is to consist of a board of six directors, one to be nominated by McGill University, who shall not be subject to the provision regarding rotation of retirement. The sum of $100,000, in cash or partly in cash and partly in bonds of a proposed issue of $350,000, is to be handed over to McGill University when the building is ready for occupancy. If the plan goes through, the association will meet next year in a building of its own. The necessary land for the building is to be obtained by emphyteutic lease from the university.

President Wilson Re-elected

J. A. Bothwell took the chair when Percy B. Wilson proceeded to put L. R. Wilson in nomination to succeed himself as president of the association. P. B. said that the report just presented by the retiring president had been the most important ever brought before the association and it was highly necessary that the work outlined in that report should be continued by the man who carried it out so well during the past year. There was always lost motion in any change of presidents and he therefore nominated L. R. Wilson to fill the office for another year. It was true that it established a precedent but it was a good one. George Carruthers seconded the motion in a brief but effective speech and it was adopted by acclamation.

Appreciation by McGill

Dr. Harold Hibbert expressed the appreciation of McGill University for the assistance of the association in the work of the chair of industrial and cellulose chemistry, as well as upon the re-election of President Wilson. He called attention to the International Congress of Cellulose which would be held in Sweden in 1928 and expressed the hope that the Canadian Pulp and Paper Association would take an active part in the proceedings of the Congress.

The Maritime Provinces

A rather lengthy discussion took place over the question of adopting a resolution favoring the passage by the Canadian Parliament of certain legislation relating to the Maritime Provinces. Angus McLean argued in favor of adopting the resolution, but it was represented that the association should observe caution before acting on matters outside of its province and an amendment prevailed referring the matter for consideration to a committee.

This practically concluded the business of the meeting which was then adjourned.

SOCIAL FEATURES

Opportunity was afforded during the annual meeting for a number of social gatherings as well as for more formal functions, like the President's Dinner. Thus there was a joint luncheon of the Technical and Woodlands Section on Thursday and a second luncheon under the auspices of the parent association on Friday. Besides these, a cabaret dinner was staged at the Mount Royal Hotel on Thursday evening, which was attended by upwards of 700 members and guests, including the executives and technical staffs of mills.

Growth of Canada's Paper Industry

Reference was made in the body of the report to the joint luncheon on Thursday. At the official luncheon of the general association on Friday, Sir Henry Thornton, president of the Canadian National Railways, was the principal speaker. He complimented the members of the association on the part they are playing in the development of Canada and in providing the material for the dissemination of news and knowledge. He recalled that in 1895 Canada's exports of pulp and paper amounted to $120 and in 1926 they were $173,500,000.

Plea for Adequate Freight Rates—Sir Henry said that the earnings of the Canadian National Railways might have been much larger during recent years if the freight rates of Canada were on the same scale as the freight rates of the United States, for instead of $46,000,000, the railroad companies would have earned $72,000,000. He made a plea for a scale of freight rates that would not interfere with the financial and physical growth of the Canadian National Railways. Freight rates, said he, cannot be constantly decreased, and net earnings constantly increased. The citizens of Canada would either pay more taxes as a result of lower freight rates, or less taxes as a result of fair freight rates.

A Nestor of the Industry Speaks

Charles Riordon, 78-year-old veteran of the pulp and paper industry in Canada, was a guest of honor at the luncheon. It was the first time in years that he had attended any of the functions of the Canadian Pulp and Paper Association. Introduced by George Carruthers, a past president of the association, who presided, Mr. Riordon spoke briefly, expressing the pleasure it afforded him to get together once more with his friends in the industry. He recalled his early experiences after entering the industry in 1864 when he was 15 years of age. The following year, when only 16, he was superintendent of the Riordon mill at St. Catherines, Ont. Negotiations with American interests and a trip to Vienna were interestingly described in connection with Canada's first contact with the sulphite process.

Flanking Toastmaster Carruthers on right and left at the head table were United States Consul-General Albert Halstead; Sir Henry Thornton, president, and W. D. Robb and A. T. Weldon, vice-presidents, Canadian National Railways; Charles Riordon; L. R. Wilson, president, Canadian Pulp and Paper Association; Hugh P. Baker, secretary, American Paper and Pulp Association; J. A. Bothwell, Angus McLean, Col. C. H. L. Jones, Carl Riordon, Brig.-Gen. J. B. White, Col. Percy B. Wilson, F. J. Campbell, D. A. Wood and Frank W. Clarke.

President's Dinner

The convention was brought to a close with the President's Dinner at the Ritz-Carlton Hotel on Friday evening, January 28. Special invitations had been issued for this function at which the guest of honor was Hon. Charles A. Stewart, M. P., Minister of the Interior. The dinner was much enjoyed. Percy B. Wilson was toastmaster and introduced Minister Stewart felicitously.

Importance of Scientific Research

With reference to the proposed erection by the association of a research laboratory at McGill University, Mr. Stewart said that the government had thought of erecting the building at Ottawa. "But you have decided that it shall be here in Montreal," he said, "and we hope that your project will meet with every success. If we have one paramount need, one matter of paramount importance to every industry in Canada, it is the development of a system of scientific research to collaborate with industry." As an example of what scientific research could do, he instanced the work of Professor Saunders in the cultivation of Marquis wheat, which had brought wealth to thousands of farmers in Canada.

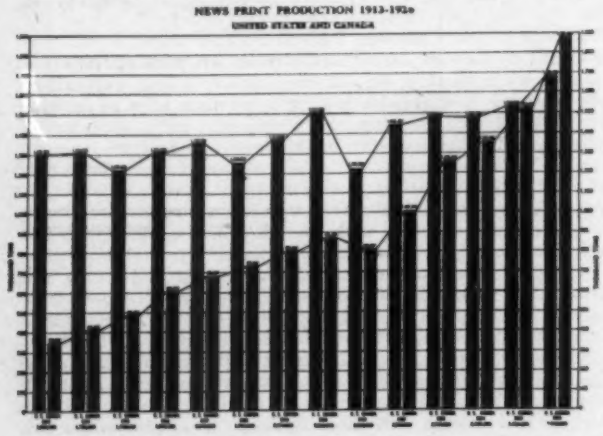
Doctor Baker Speaks for the United States

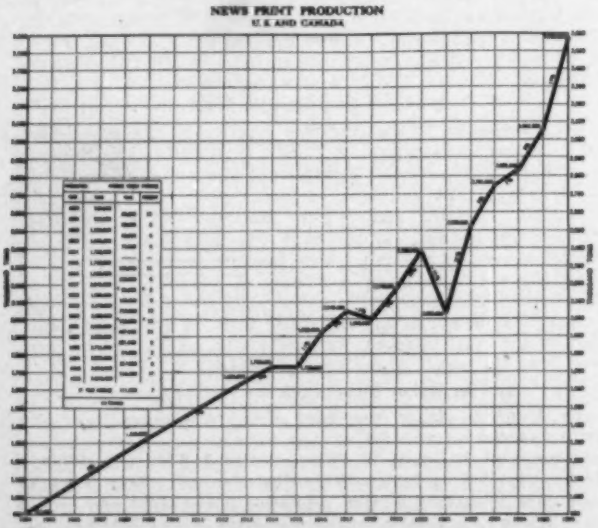
Dr. Hugh B. Baker, secretary of the American Paper and Pulp Association, was called upon for a speech, in the absence of President Norman W. Wilson, who had been prevented from attending by indisposition due to a cold. Doctor Baker said that President Wilson regretted his inability to attend as much as he was sure those present would, but his physician had forbade him to leave the house. Dr. Baker spoke in optimistic vein of industrial conditions as affecting relations in the industry between the pulp and paper manufacturers of the United States and Canada. There was a constant inter-

change of men and raw materials and finished goods which he hoped would always continue. The chief problem facing the industry at present was the creation of a permanent natural supply of wood. As evidence of the pleasant relations that existed between the two countries he referred to the establishment of an international conference committee. In closing he extended greetings from the industry south of the line and hoped that many Canadians would come down and assist in celebrating the fiftieth anniversary of the American Paper and Pulp Association on February 21. Other speakers included E. W. Butler, of the Buffalo News, vice-president of the American Newspaper Publishers' Association; and George H. Montgomery, K. C., of the Montreal Bar, who is counsel for the Canadian Pulp and Paper Association.

Canada Leads in Newsprint

At the annual meeting of the News Print Service Bureau on Friday, R. S. Kellogg, secretary of the bureau submitted a report of unusual interest pertaining to the production, consumption and present stocks of newsprint paper in North America. He said that the year 1926 definitely gave Canada world leadership in newsprint paper manufacture and established beyond gainsay that the United States was by far the greatest user of newsprint paper. Notwithstanding the great gain in production credited to Canada during 1926, the production of the United States mills was 1,687,000 tons and greater by 156,000 tons or 10 per cent than the previous high record of 1925, while there was a gain of 93 percent in Newfoundland as new operations got into full swing in that country and brought the total up to 186,000 tons. Even the production of 13,000 tons of newsprint in Mexico was 6 percent over the previous year. The total North American production of newsprint in 1926 was 600,000 tons or 19 percent ahead of 1925 and was made possible by the high operating record of 96 percent of rated capacity.





Sources of Paper Consumed

Newsprint available for consumption in the United States in 1926 was, in round numbers, 3,500,000 tons or 18 percent over 1925 and 56 percent of the world consumption of this commodity. Into this total went all but 19,000 tons of the United States production, 49 percent of the Newfoundland production, 88 percent of the Canadian production and 102,000 tons of overseas newsprint. However, importations of European newsprint which began in 1920 and reached 200,000 tons in 1923 have been steadily declining since that year and will probably go still lower in 1927.

Nearly 3½ Million Tons of Paper Used

Probably not far from 100,000 tons of the available supply of newsprint in the United States in 1926 went into stock so that the actual consumption was around 3,400,000 tons or at the rate of 58 pounds per capita compared with 52 pounds in 1925. This was an increase of 12 per cent in per capita consumption and 14 percent in total consumption or twice the average increase during the past 25 years. Such use of newsprint last year was the climax of steadily increasing sizes and circulations of daily and Sunday newspapers. The growth in size is due to the increased volume of advertising which in 1926 surpassed the previous record by 5 percent and to the addition of many special features and special sections to suit the varied taste of the reading multitudes. Growth in circulation is the result of vigorous extension campaigns on the part of publishers, of improved mail facilities and of the steadily growing number of people who naturally buy one or more newspapers daily.

Circulation of the English language newspapers in the United States now totals 36 million copies of the daily issues and exceeds 24 million copies on Sundays. During the past year, the circulation of the daily papers increased nearly 7 percent and that of the Sunday papers almost 5 percent. In 1926, the newspapers in the class of 100,000 circulation and over, averaged 31 pages daily and 111 pages on Sunday compared with 23 pages daily and 79 pages Sundays in 1920. It is, of course, not reasonable to expect a long continuation of such rapid increases.

Mills Will Have Capacity of 15 Million Tons

From the beginning of 1919 to the end of 1926 additions to the newsprint manufacturing industry in North America totaled 64 machines with a rated capacity of 4,800 tons. Of these, 5 machines were installed in Newfoundland, 11 in the United States and 48 in Canada. Counting in the installations now nearing completion, the North American newsprint machines, by the middle of the present year, will have a daily capacity of 15,000 tons. Over a long period of time the industry has produced at an average of about 90 percent of rated capacity. On this basis, if all the present machines stay on newsprint, there will be a continental production capacity somewhat in excess of 4 million tons per year by the third quarter of 1927.

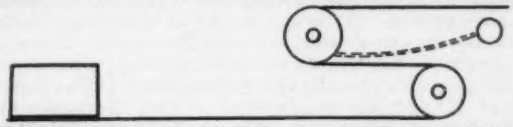
The foregoing report was the first business taken up at the meeting of the News Print Service Bureau on Friday afternoon at 3 o'clock. It was followed by a financial statement and then the election of officers was held with the following results: President—Louis Bloch, president Crown-Willamette Paper Company, 248 Battery Street, San Francisco, Cal.; Vice-President, F. J. Campbell, general manager, Canada Paper Company, Ltd., Windsor Mills, P. Q., Canada; Secretary-Treasurer, R. S. Kellogg, 342 Madison Avenue, New York; Executive Committee, Percy B. Wilson, vice-president, Spanish River Pulp and Paper Mills, Ltd., Sault Ste. Marie, Ont., Canada; J. Leonard Apedaile, managing director, Price Bros. & Co., Ltd., Quebec, P. Q., Canada, and A. R. Graustein, president, International Paper Company, 100 E. 42nd Street, New York, N. Y.

The Detroit Sulphite Pulp & Paper Co., Detriot, Mich., announce the appointment of H. R. Telfer as manager of sales to succeed P. M. Allen, resigned. Mr. Telfer has been with the mill for several years as assistant sales manager.

Practical Helps for the Mill Man

A System for Cleaning Press Felts

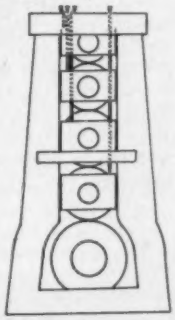
A BOARD mill superintendent has lengthened the life of his press felts tremendously by the simple felt conditioning system shown in the accompanying sketch. A shower is placed so that it plays on one of the rolls on the return of



the felt. The shower is fairly heavy and plays on the roll—not on the felt. The felt then runs around another felt roll and so on to a suction box. The suction box takes the water out and the felt is practically clean, as the water has then gone through the felt.

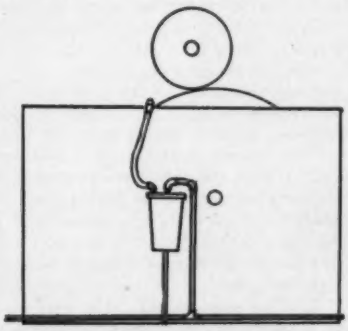
Oil Ducts to Calender Bearings

THE time of the backtender in climbing around the calender stack to oil the calender roll boxes may be conserved by running a set of half inch pipes from the top of the calenders to each of the roll bearings. The accompanying diagram shows a stack with only a few rolls for illustration, but it is obvious that the more rolls there are, the more time will be saved. There will probably be some saving of oil as well, as the little pipes carry the oil into the box itself, while the fourth hand when he does this work, as is sometimes the case, is not always particular where the oil goes.



Settling Tank on Single Pipe Line

THE diagram shows the pipe line supplying a water deckle on a cylinder machine. A water deckle is not a new device. The interesting point is the little tank which is attached to the line from the common supply pipe to the spray pipe itself. The tank is adapted from a steam trap which has outlived its usefulness. The tank serves to catch any sand or foreign matter which might be contained in the water. This little device was applied on a cylinder machine making heavy chip and container boards. In such mills there are not usually extensive arrangements for settling or filtering the water supply of the mill, but sand would easily clog the holes of the water deckle. This device might have applications on the pipe lines to other showers or sprays where it was desirable to settle sand or foreign matter out of the water before it could clog the holes.

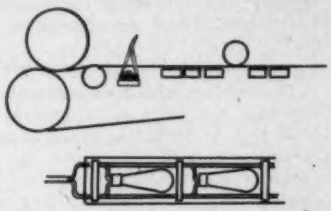


To Take Dust Off of the Dryer Doctors

THE removal of an accumulation of dust from the dryer doctors when the machine is running is a delicate matter. The dust has to be removed, however, and, on long runs without breaks, while the paper is on the dryers. One mill man has devised a simple nozzle which instead of having an opening at the end has a long slit in the side. The nozzle is connected by a hose to the vacuum pump of the machine. When it is necessary to take the dust off of the doctor, the nozzle sucks it all away without any inconvenience.

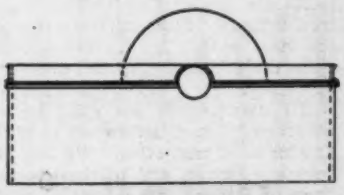
Lights Under the Wire

ONE superintendent recommends heartily a set of lights on a board running across under the wire between the last suction box and the guide roll. About one lamp per foot of wire width is right and the whole is connected to a convenient lamp socket or service socket. For cleaning the wire or looking it over for cracks, this set of lamps is very desirable. The board is stoutly made and is left in place while the machine is running. The board is cleaned and the lamps are tested each time the wire is put on.



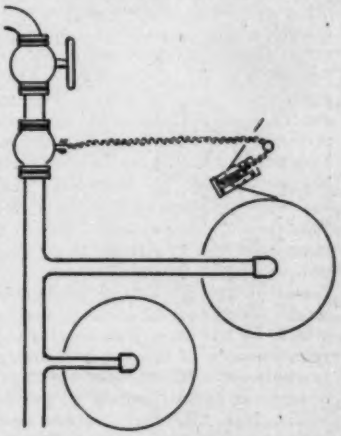
Increased Beater Capacity in an Emergency

IT WAS absolutely necessary to get more production through the only two beaters in a small mill. Raising the sides was hardly new, but how were they to raise the sides in the case of these rather old type, iron tub beaters. The superintendent noted the flange-like shape of the edge of the tub. He located some pieces of twelve-inch channels. These were bent into shape, drilled along one flange and bolted to the flanged edge of the tub. The joint was rendered tight with jacket belt laid there before the bolts were tightened. This gave nearly twenty-five per cent additional capacity on the 1000-pound tub.



Humidity Control Device for Board Machine

A BOARD machine man has the following simple device on his steam line to take care of small fluctuations in the humidity content of the sheet as it comes over the machine. It does not, of course, take the place of the more scientifically devised systems for regulating the drying steam, but it would seem to care for small changes either in steam flow or sheet thickness in such a way as to tend to produce a more uniformly dried board. The device is applied to the spring roll between the last dryer and the first stack of calenders. There is another valve beyond the valve with the hand wheel. To the stem of this valve a chain is attached, and as the spring roll goes up and down, a little more or a little less steam is admitted to the dryers. The spring roll, of course, goes up and down a little with the dampness of the sheet and in this way the steam is varied a little to meet this condition.



The Hammermill Paper Co. announces the appointment of the Arnold-Roberts Co. of New Haven, Conn., as successors to New Haven Paper Co., Inc., as a Hammermill agent.

Advances in Paper Mill Drives

By D. H. KNUCKEY
General Electric Co.

IN RECENT years the General Electric Co. has made many outstanding contributions to the paper industry. This review is by no means complete and will serve simply to call attention to some of the beneficial results of intensive research and practical engineering work carried on in conjunction with the manufacturers of paper.

Turbines

This section of the review will be confined to small turbines designed for driving mechanical loads, such as pumps, and 3600 r. p. m. turbines, which form the prime movers of A. C., 60-cycle, turbine-generators, the former known as type "D" turbines and the latter as types "F" and "R." Type "F" is used in the cases of turbine-generators of capacities up to approximately 1500 kw., and the type "R" for units between 1500 kw. and 10,000 kw., or approximately so. All types operate on the Curtis or impulse principle.

All high-pressure heads, steam chests, throttles, and other parts, subject to high-pressure steam, are designed for a maximum of 400 pounds' pressure and temperature up to 750° F. We have done this because we are confident that the tendency is toward increased pressures and superheats. These parts are made of cast steel, with monel metal or stainless iron fittings. Exhaust shells are of cast iron. Whether we use steel or iron for the intermediate wheel casings, depends upon the temperatures and pressures to which they are to be subjected.

All diaphragms are split horizontally, to facilitate dismantling. Those subjected to high pressure or temperature are made of cast steel. We use reamed nozzles in the high-pressure stages, and in the low-pressure end, nozzles in the form of blades cast into the diaphragms.

The materials used for wheel blading are monel metal, stainless iron, and steel drop-forgings, the former at the high-pressure end. All wheels are machined from solid steel forgings. The blades are secured to the wheels by means of dovetails.

We use heat-treated, nickel-steel shafts.

All turbine generators of the types under consideration are of the three-bearing design, in which the turbine shaft rests in two bearings, one at each end; and the generator shaft, with its rotor, rests at one end in a bearing, and at the other end is rigidly coupled to a flange on the turbine shaft. Carbon shaft packing is standard for the high-pressure ends of all machines, and for the low-pressure ends, provided they do not exceed 8 in. diameter. Above 8 in. diameter, labyrinth packing is usually used. Diaphragm packing (around the shaft) is of segmental bronze, suspended by springs and restrained from touching the shaft. A new form of relayed hydraulic speed governor has been recently developed and is being used with the new machines. It is exceptionally quick in response and practically free from over-travel and "wander." Many types of special governing mechanisms have been produced by our governor specialists. Some of these are unique and of unusual interest; as, for examples, the several forms of automatic back-pressure control, and the three-arm lever automatic-extraction and speed control mechanism, which, by the way, was developed especially for the exacting requirements of the paper industry. Of course, each machine is equipped with an over-speed, emergency governor, set to operate at approximately 10 per cent over-speed.

The type "R" turbines are equipped with a single-thrust collar, opposed by plates. The babbitted plate, which takes the thrust in the direction of the steam flow, is spring supported to equalize the thrust over the whole area of the collar.

In both types "F" and "R" turbines, complete steam admission is to the first stage. Type "R" machines receive steam into both the lower and upper halves of this high-pressure head. The first steam entering, sufficient to carry approximately half load, enters in the lower half of the casing through a single throttling valve. The needed additional steam to carry loads in excess of half load, enters the upper half of the casing through a series of four to six throttling valves. This is done to improve first-stage nozzle efficiency, and increase turbine economy.

Types "F" and "R" turbines can be built for straight condensing or non-condensing operation. They can be arranged for non-automatic extraction at one or several pressures, or for automatic extraction at one or two pressures. It is difficult to visualize steam conditions in this industry that can not be successfully and economically conformed to by these machines.

Type "D" turbine construction is well illustrated in the accompanying photographs. The general divisions into which these units may be divided are as follows:

Type D-52—Equipped with 16-in. wheels, one or two stages, and mechanical shaft governor.

Type D-53—Equipped with 25-in. wheels, includes one, two, or three stages, and hydraulic governor.

Type D-54—Equipped with 25-in. wheels, one, two, or three stages, and mechanical shaft governor.

Type D-50—Equipped with a 25-in. wheel first stage, 27-in. second stage, and 31-in. wheels third, fourth and fifth stages, and hydraulic governor.

This last machine has been designed primarily for condensing operation. These turbines cover the range in capacity from 50 to 800 h. p., and in speed from 500 to 7700 r. p. m., and can be operated under steam conditions up to 400 pounds' pressure, 750° F., condensing or non-condensing.

Paper Machine Drives

The paper machine has been given a surprising amount of attention during recent years, especially with reference to the drive; and while much has been learned since the dawn of the sectional drive, the topic has by no means lost its interest, nor has it been exhausted. Probably more thought has been given to the drive during the past six years than to the machine itself; but the pendulum has begun to swing back, and all indications point to an era of improvements in the machine itself. Even the mechanical drive with its long line shaft has received its share of attention; and while the present types are far superior to those used a generation ago, they are admittedly out of the race where high-speed machines are involved.

The essential requirements of any paper machine are the same, regardless of the type of drive used; i. e., the speed of the machine as a unit must be held constant, to preserve a uniform quality and a uniform weight of product; the speed of the various sections of the paper machine with respect to each other, must be held constant within very close limits to prevent breaking the sheet; each section must lend itself to starting, stopping, and slow-speed operation, without respect to the other sections of the machine.

Classes of Drives—Paper machine drives may be divided into two classes:

I—The mechanical drive with steam engine, steam turbine, or electric motor as the prime mover.

II—The sectional electric drive.

The first division includes the bulk of paper machines in operation today and may be divided into a number of groups, classed according to the prime mover used:

1—A constant speed steam engine with either step cone pulleys, tapered cone pulleys, or other mechanical speed changers.

2—A geared turbine of either the constant-speed or variable-speed type.

3—An electric motor, either direct connected or belted to the back line shaft of the paper machine.

Under class 3 may be included:

A—The slip-ring induction motor.

B—The brush-shifting A. C. commutator-type of motor.

C—The direct-current adjustable-speed motor.

Mechanical Drives—The mechanical drives included under

Division I have always been considered as the most simple type of drive, probably because they are mechanical and more readily understood; but we confess to a feeling that they are more complex than any sectional electric drive that was ever built, and require considerably more attention.

The constant-speed steam engine with mechanical speed changer, or the variable-speed steam engine, represents the great mass of paper-machine drives, and its greatest criticism is due to its inefficiency and its inability to hold a constant speed. However, the fact that it is so strongly intrenched in the field and subject to so little criticism, leads one to believe that the rigid requirements imposed on electrical manufacturers during recent years are not absolutely essential to successful operation.

A number of geared turbines have been installed with mechanical drives, eliminating the electrical link between the turbines and the mechanical drive; and while these units are operating successfully, both as constant speed and adjustable speed prime movers, it is not always possible to obtain a steam balance, and this fact prevents a more universal application.

The single-motor electric drive is still a popular drive; it is confined almost entirely to the direct-current motor with a direct-current generator, and voltage control or a combination of voltage and field control. This type of drive, apart from the mechanical back line with its adjuncts, is undoubtedly the most simple electrical drive available, and, until recent years, has met all of the requirements. However, the demand for extremely close speed regulation on the sectional electric drive has been more or less coincident with a similar demand on single-motor drives, and the use of voltage regulators or some form of speed regulator, is now essential to satisfy the demands.

Both types of regulators have been furnished extensively; but while the use of voltage regulators on both the exciter and generator of a single-motor drive improve the regulation, they do not take into consideration the inherent speed regulation of the motor, nor do they correct for it. The speed regulator, on the other hand, maintains a constant speed within very close limits, regardless of fluctuations in generator voltage. For this reason, we are rather inclined to favor the use of a speed regulator. In addition to this feature, it will permit of wider variations in speed by voltage control than you can ever hope for in the voltage regulator. Both types of regulator are necessarily expensive, but this expense is partially offset by the use of compound field rheostats, rather than the compound compensating type, which was necessary when no regulator was used.

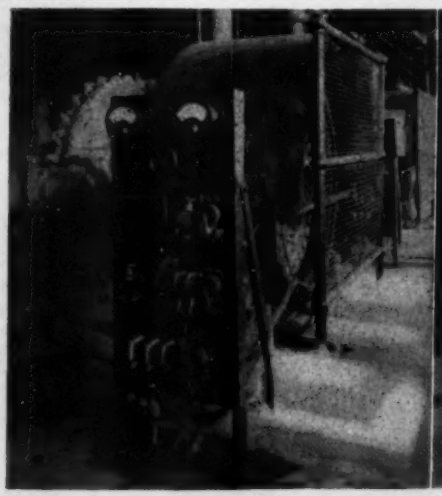
Mention has been made of the slip-ring induction motor for paper-machine drives, because several such installations are in existence; but it, nevertheless, is a misapplication, and it can never give successful operation except, possibly, on a constant-speed machine, and even there it is subject to variations in frequency. Its use is not recommended under any conditions. The BTA alternating-current commutator motor has been used more extensively on the continent than here; and while the present installations in America have been successful, they have been confined to motors below fifty (50) horsepower. This type of motor has a speed regulation comparable to the direct-current motor at full speed, but does not compare favorably with it at the reduced speeds, although this difficulty may be corrected by the use of a speed regulator that acts directly on the brush mechanism. As stated above, our past experience has been confined to small-capacity motors, but it is hoped that it will soon be available in the larger sizes and open up a very interesting field of application.

Sectional Electric Drive—The sectional electric drive, mentioned under Division II, stands alone as a distinct type, and it has always been looked upon as expensive and complicated. To be sure, it has a multiplicity of electrical units and is 100 per cent electrical, and, therefore, not understood by the ordinary millwright who has spent years in maintaining mechanical drives.

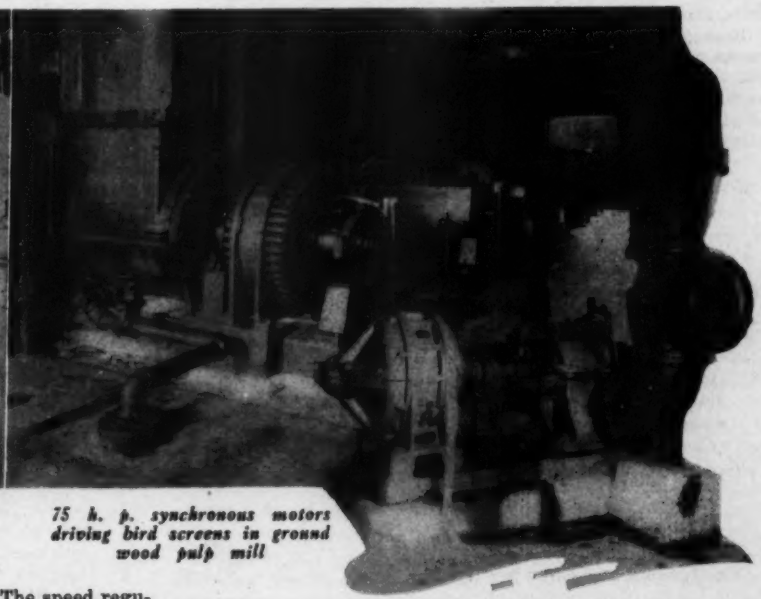
We have already hinted at the complexity of the mechanical drive, and it is only necessary to consider the long line shaft, with its bearings, counter-shafts, pulleys, belts, miter gears and clutches, to catch a glimmering of my meaning. They are oily, dirty, dangerous, space hogs, and even under the most favorable conditions, invite an apology for their appearance. We are not criticizing the millwright or the mechanical engineer who designed these drives, because some of them are masterpieces of a worthy craft. They met the need of the day and must now give place to a better method.

The inherent advantages of the sectional electric drive over any other type of drive, will always justify its use. The chief difficulty in comparing a sectional drive with any type of mechanical drive, has been in neglecting to take the backline shaft into consideration and merely comparing the cost of the electrical equipment. The backline shaft is, of course, eliminated in the sectional drive; but it is a very essential part of any single-unit mechanical drive and therefore its cost must enter into any comparison.

Cost Comparisons.—A mechanical drive will vary in cost with the number of sections on a machine and with the width of the machine, but is somewhat independent of the speed.



104 h. p. synchronous motors driving Nash vacuum pumps for flat boxes and suction rolls



75 h. p. synchronous motors driving bird screens in ground wood pulp mill

150 h. p. squirrel cage motor driving paper machine white water pump

Figures obtained from some of the manufacturers seem to indicate that the backline shaft with its bearings, cone pulleys, jack shafts, miter gears, clutches, etc., neglecting the prime mover, cost from $2,500 to $3,000 per section for an average paper machine.

With these figures as a basis, an interesting comparison may be made.

I—(A)—A seven-section cylinder type of paper machine operating at 100 to 300 ft. per min.

Installation Cost:

a—Backline shaft	$17,500.00
b—Single motor, direct-connected type	4,900.00
c—Generator unit and control	8,500.00
	$30,900.00

Operating Cost:

Interest at 10%	$ 3,090.00
Maintenance at 30 cents per ton	2,250.00
	$ 5,340.00

I—(B)—A seven-section cylinder-type of machine operating at 100-300 ft. per min.

Installation Cost:

a—Sectional drive, including gears, control, etc.	$25,000.00
b—Generating unit and control	9,300.00
	$34,300.00

Operating Cost:

Interest at 10%	$ 3,430.00
Maintenance at 5 cents per ton	375.00
	$ 3,805.00

In both of the above cases a synchronous motor generator set is used, and the labor item is assumed to be the same; consequently, this latter item has been neglected.

The difference in operating cost of $1,535.00 in favor of the sectional drive may be capitalized at $15,350.00 and it would indicate that it is possible to invest $49,650.00 in the sectional drive and still break even with the mechanical drive.

It may be argued that the cheapest form of drive is the mechanical drive with steam engine or turbine. This is true, but the comparison still favors the sectional electric drive, as will be seen from the following data:

II—(A)—A seven-section cylinder-type of paper machine operating at 100-300 ft. per min.

Installation Cost:

a—Back line shaft	$17,500.00
b—Steam turbine and gear unit	6,500.00
	$24,000.00

Operating Cost:

Interest at 10%	$ 2,400.00
Maintenance at 30 cents per ton	2,250.00
	$ 4,650.00

II—(B)—A seven-section cylinder-type of paper machine operating at 100-300 ft. per min.

Installation Cost:

a—Sectional drive, including gears, control, etc.	$25,000.00
b—Turbine generator unit with control	13,000.00
	$38,000.00

Operating Cost:

Interest at 10%	$ 3,800.00
Maintenance at 5 cents per ton	375.00
	$ 4,175.00

In this comparison, the difference is not so great, because of the lower cost of the mechanical drive and the higher cost of the sectional drive incident to the use of a turbine generator set. However, an additional cost of $4,750.00 would still be justified in the sectional drives.

On higher-speed paper machines, this comparison still holds good, but owing to the increased tonnage a greater saving may be made.

III—Comparison of drives for a nine-section Fourdrinier machine operating at 200-600 ft. per min.

Installation Cost:

a—Back line shaft	$27,000.00
b—Single motor electric drive with motor, motor generator set, and control	17,500.00
	$44,500.00

Operating Cost:

Interest at 10%	$ 4,450.00
Maintenance at 30 cents per ton	4,500.00
	$ 8,950.00

Installation Cost:

a—Sectional drive with gears, motor control, and motor generator set	$45,000.00

Operating Cost:

Interest at 10%	$ 4,500.00
Maintenance at 5 cents per ton	750.00
	$ 5,250.00

Here the difference of $3,700.00 in favor of the sectional drive may be capitalized at $37,000.00.

In all of these comparisons, the moderate-speed geared motor, such as we have furnished on seven-section paper-machine drives, has been used; but only those advantages which lend themselves readily to a monetary value have been mentioned. There are other recognized advantages, such as increased production and a more uniform product, which are the direct result of closer speed regulation between sections, and a more uniform speed of the machine as a whole. Cleanliness, a saving in space, greater flexibility of control, neat appearance, and safety to operators, are other features that cannot be overlooked when considering the drive.

Features of Sectional Drive—Having justified the sectional electric drive, a few of the more important features of it may be of interest:

I—Full Automatic Control; Including:
1—Starting.
2—Stopping.
3—Slow-speed operating, obtained by push buttons mounted on each section, front part of machine.
4—Complete protection.
5—Motor operated "draw" adjustment, from front side of machine.

II—Unit Switchboard Control Panel; Features:
1—All control boards, including generator, voltage regulator, machine motors, and rewinder control, mounted as a single switchboard.
2—Indicating meters for all motors and generator, are furnished as a part of the standard equipment.

III—Simplicity; Features:
1—Control panels are all mounted in one place.
2—Each motor, with its speed regulator, a complete unit in itself, is mounted on one base.
3—No apparatus in machine room but motors and control buttons.
4—Every piece of apparatus readily accessible.
5—A minimum of parts insuring low maintenance.

IV—Minimum Space Requirements.

V—Simplest Form of Regulators; Futures:
1—Minimum of moving parts.
2—450 operating points.
3—Vernier rheostat adjustment.
4—Remains stationary, except when load change demands movement.
5—Does not alter motor field when disconnected from circuit; motor continues to operate at same speed as when regulating.

Other Developments—We have made reference to an era of development in the paper machine. This probably started with the suction couch, which has undergone many changes and now appears without the use of a gear reduction.

There is a concerted effort to reduce the friction losses in the machine, as is now evidenced by the extensive use of ball or roller bearings on practically all sections of the paper machine except the dryers and calender.

The use of self-aligning oil-ring bearings on the dryers and calenders, has done much to decrease the friction loss, and this modification has gone hand in hand with a higher grade

of bearing lining and journal; but there is still much to be accomplished in this direction.

The appearance of the worm-gear-driven dryers has been another step in the recent development, and we now hear of chain-driven dryers. This last arrangement appears to be good, and results are awaited with keen interest.

There are, however, other features that are worthy of attention and that mean much to the paper manufacturer. For instance, every couch is equipped with suction boxes on the wire, and on the average machine, the friction due to these boxes amounts to 35-50 h. p., or approximately 360,000 kw. h. per year. The elimination of this friction means an enormous saving to the industry, not only in power consumed, but also in money saved due to the longer life of the wire.

Water in the dryers is extremely annoying, requires power to keep in motion, and undoubtedly has an effect on the efficiency of drying. This difficulty suggests a possible improvement in the evacuation system.

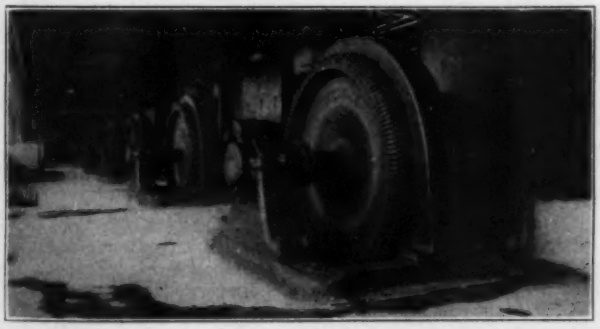
Not all of the difficulties experienced in paper making are due to the electrical equipment; there are a thousand and one things that can happen to the machine itself or to the process; but the development of a consistency regulator that will perform its function, would eliminate a large part of them.

It has been extremely interesting to watch the developments that have taken place in the paper industry during the last five years. The possibilities are great, and with a hearty co-operation between the paper manufacturer, the machinery manufacturer and the electrical manufacturer there is no limit to the possibilities of the future.

Control Equipment

To the engineer responsible for the selection and application of control for motors in the pulp and paper industry, the equipment for the paper-making machine is of vital importance and offers fascinating study, since much has been achieved in that direction. There has been, however, noteworthy advances made in the characteristics and features of control for the general run of motors necessary to the operation of the mill, as for conveyors and pumps, some considerable of which may be of interest.

Thermal Overload Protection—Thermal overload protection devices in the form of cutouts up to 5 h. p., and relays on control for larger motors, have become familiar to us all; but up to a short time ago, the only inverse time relays were of the dashpot-retarded variety. Thermal relays are now available, and permit the motor to assume intermittent overloads within its capacity without cutting it off the line, and,



Fifteen 2800 h. p. synchronous motors each driving two magazine pulp grinders

at the same time, stand ready to function when protection is required.

Recent improvements in these devices have been made in several respects, such as:

1—Care taken in manufacture, test, and adjustment.
2—Safeguards against tampering.
3—Interchangeability of thermal units.

Thermal relays operating on all sorts of principles have appeared and their merits set forth. It will pay to investigate carefully the manufacturing and testing methods followed in their production, and the likelihood of the maintenance of adjustment.

Starting Compensators—A new and definite step forward has been made in manual compensators for 2200-volt motors. These, known to us as CR1034 Forms K17 and K21, are of the deadfront type with all live parts back of a steel panel. The switch is of improved interrupting capacity, with barriers in the oil tank between poles. Thermal relays closely following the motor heating curve, afford over-load protection

3 h. p. direct current automatic feed regulator on Warren magazine pulp grinder arranged to control load on synchronous driving motor

by tripping the undervoltage release which is provided with a time delay mechanism that insures throwing the interruption of a short circuit back upon the breaker in the line.

These new high-voltage compensators have found a ready welcome on the part of those who appreciate their merits.

Time Delay Undervoltage Release—Reference has been made to the time delay mechanism provided in the 2200-volt manual compensators. A similar mechanism is available, as desired, with compensators for low-voltage motors, and it takes the form of an attachment that can replace the standard instantaneous release on the same mounting holes in the side of the case.

Brief power disturbances that result in the tripping of starters and the consequent cutting off of motors, have been a source of much annoyance and loss of time to industrial plants. Modern power supply systems seldom fail long enough to permit motors to drop considerably in speed, but occasional disturbances, which may last for only a few cycles, seem impossible to prevent. These disturbances may result in voltage reductions or complete outages.

To meet the demand for time delay release, this attachment has been produced. It provides 1½ seconds' delay, which is long enough for most known conditions. A longer delay might find the motor almost at rest, as would be likely with such a load as afforded by a conveyor. In any event, this attachment has been hailed with satisfaction by many, who see in it the solution of their difficulty.

An ingenious time-delay push-button station is just entering the trial stage for use with standard magnetic starters for all kinds of motors. While the starter will drop out instantly when power fails, the station will cause it to refunction automatically, provided the voltage interruption does not exceed the time delay provided—in this case, also, 1½ seconds.

Magnetic Control—While manual starters still have a wide field of usefulness, the trend toward the use of magnetic con-

trol has been very pronounced, perhaps doubling each year. The convenience of push button control and other advantages of economy and safety, hold true for all types of motors, and are quite strikingly in the case of the synchronous motor.

It is surely true that the advent of the automatic starter for synchronous motors encouraged their more general use by clearing away much of the mystery of getting them properly on the line. The CR7065 full-voltage starter and the CR7061 reduced-voltage starter, have incorporated all that is necessary to the proper starting and protection of synchronous motors. Perhaps, the most interesting feature, common to both, is the field actuating relay.

The operating coil of the field actuating relay becomes energized when voltage is applied to the motor; but the immediate closure of the relay contacts is prevented by a retarding coil in series with the motor field and energized by the current induced in the field winding. The retarding coil holds the relay contact arm motionless until the motor accelerates to approximately ninety-five per cent of synchronous speed, when the induced field current decreases and the arm is released, closing the relay contacts, whereupon the field contactor closes. By adjustment of a spring the closing of the relay, contacts may be delayed for several seconds after the contact arm is free to move. This brief delay insures that the motor will accelerate its load to the maximum possible speed before the field voltage is applied.

The CR7061 and CR7065 starters also provide undervoltage protection upon failure of either line or excitation; also, thermal overload protection, and automatic opening of the field circuit when the motor is shut down.

Time Limit Control—Magnetic control holds much of interest that we must pass by at this time, but the drift from current-limit to time-limit control is of particularly timely interest. Before certain timing devices, only recently available, were developed, the choice for the automatic accelerating principle for an alternating-current motor lay between a current limit relay and a dashpot. Experience with dashpots turned our designing engineers to the use of the current limit scheme as the more dependable, even with the known handicap that the motor could be gotten no further if it did not start on the first point, or accelerate sufficiently to permit the relay to function.

The new timing devices are dependable mechanisms, as exemplified by the motor-driven geared relay used on the CR7061 automatic starter, by the flywheel delayed time attachment on the manual compensators, and by the pendulum device found as part of the time-delay push-button station.

The pendulum device, which is the latest, seems to be applicable to many other types of control, such as D. C. automatic starters.

Semi-Automatic Starter—Although full magnetic starting of synchronous motors has certain advantages, there has been some demand for a less expensive control. This has been met by the CR1135 line of semi-automatic starters, which utilize a standard manual starting compensator, together with the automatic field actuating relay and field contactor, which function exactly as on the automatic controls. Exciter field rheostat, ammeters, undervoltage protection, and overload protection are likewise provided.

These semi-automatic controls thereby make the manual starting of synchronous motors as simple as the starting of induction motors by standard manual compensators.

Drum Controllers—Within the past year, new lines of drum controllers have been brought out incorporating a number of improvements, the more important of which are:

1—The use of self-aligning fingers backed by helical springs. The construction provides for ready adjustment of contact pressures and for longer life of wearing parts. At the same time, the new controllers are much easier to operate than the superseded types.

2—The use of wood has been eliminated in the construction of these controllers. All parts are of metal or high-grade molded material.

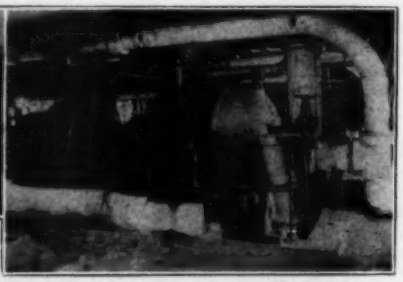
3—Provision is made for conduit wiring on all forms and sizes, and for ample room for bringing in the leads makes for convenience in wiring.

4—There are a number of interesting construction details concerning the frame assembly and the attachment of several kinds of operating mechanisms that will repay the study of anyone who may be interested.

Drum controllers are used in the pulp and paper industry, chiefly with slip-ring induction motors when manual control is desired. The drum controller as a general type has been on the market for many years, and has always enjoyed the reputation of a dependable, serviceable control. The recent improvements will do much to sustain such well merited reputation.

Sectional paper machine drive of the regulator type utilizing moderate speed motors and spur gear speed reducers

700 kw. turbine generator consisting of turbine, gear reducer, direct current generator, a. c. generator and exciter. Motor generator at left is master set for synchronous regulators—motor generator set at right drives rewinder by Ward Leonard control



500 kw. turbine generator for driving 164" paper machine at 1200 ft. per minute

Phase Failure and Reversal—A device, not particularly new, but worthy of more consideration than it has received, is the open-phase and phase-reversal relay. It furnishes complete protection to a polyphase motor against damage from a phase failure, or a reversal of one phase of the power supply.

This protection is afforded either when attempting to start the motor or when the motor is running. It can be used on any 2- or 3-phase system, except 3-phase, 4-wire.

Anyone who has had or may have any trouble with phase failure or reversal, will find this reliable device worthy of a careful investigation.

Materials and Finishes—The use of slate for industrial control panels and bases has been almost entirely abandoned in favor of molded material. The compound made especially for us and to our specifications is ebony asbestos board, subjected to heavy pressure, which makes it tough, impossible to crack, and moisture resisting. For example, the 1⅛ in. thick panels are made of 1½ in. thick ebony asbestos board, submitted to a pressure of 900 lbs. per square inch. The resulting material will not give way under pressure of nuts holding studs in place. It takes a neat finish.

Another departure with respect to materials is the cadmium plating or tin plating of all brass and copper parts, and the cadmium plating of many of the smaller steel parts of control devices mounted on panels. The result is a decidedly attractive combination of black and silver, far superior in appearance to anything hitherto done, even when polished parts were resorted to.

However, the tin and cadmium plate is used for other motor important reasons. We know a great deal more than formerly about the results of oxidizing on contact carrying capacity. This knowledge comes from a long series of tests.

As a result, the contact surfaces that are under considerable pressure are tinned, and contacts under light pressure are cadmium plated. This treatment prevents the oxidation that sooner or later will decrease the effective contact.

Cadmium plating is also used on many of the smaller steel parts, where it is often preferable to a paint or enamel by reason of improved appearance, and also because the parts can be more easily plated and more readily handled without marring the finish. When a steel part serves as a moving element that is hinged or turning on a pin or other bearing, the advantage of the plating over paint or japan is obvious.

This review briefly presents some of the outstanding recent improvements of general interest in the art of industrial motor control. There are many other achievements of general and special interest in this field, which we do not have the time to consider now. It is hoped that what has been presented is convincing that control designers are keeping abreast of the times in meeting demands as they develop.

Drives for Supercalenders and Platers

The supercalender is used on certain grades of paper to give a finer finish than is possible on the calenders of the paper machines. This machine is very similar to the paper-machine calenders, consisting of a stack of iron and paper or cotton rolls with means for varying the pressure between them. The machine is usually driven from the bottom roll, the other rolls being driven by friction.

The power required to drive the supercalender varies with the pressure used, but is, in general, a constant torque proposition like the ordinary calender. The average power required is 1 h. p. per inch of roll width at 500 ft. per min., and varies in direct proportion with the width of roll and the speed. As different grades of paper are calendered on the same machine, the drive must be arranged to give adjustable speeds. A slow speed of approximately 50 ft. per min. is also required for threading in the paper.

The two general types of drives are the group drive and the individual drive. The group drive is very seldom considered now for supercalenders, so we shall confine our discussion to the principal types of individual drives.

For alternating current, we have a choice between the two-motor drive and single motor dual frequency drive. For direct current, we can use either the two-motor drive or the single motor double voltage drive. Each of these four drives will be considered briefly.

Two-Motor A. C. Drive—The two-motor alternating current drive is by far the most common. It consists of a slip-ring induction motor for the calendering operation, and a small squirrel-cage motor with reduction gearing and an over-running clutch for the treading in speed. The control equipment includes a push-button station for starting the small motor. At the end of the threading-in period, a drum controller is operated, which starts the main motor. Approximately 50 per cent of maximum speed is obtained on the first point of the drum controller, and other speeds, between 50 per cent and 100 per cent, can be obtained by moving the drum controller handle around. The over-running clutch prevents the small motor from being driven at a high speed when power is applied to the main motor. The control equipment is arranged to stop the small motor automatically when power is applied to the main motor, unless the calender is arranged to use the small motor for driving the oil pump, raising and lowering the rolls, etc. Ordinarily the control also includes a "plugging" contactor, to supply reverse power to the main motor when it is desired to stop quickly. When the "stop-brake" push button is pressed halfway down, the equipment runs on its momentum until it stops. When this button is pressed completely down, the reverse power or "plugging" contactor closes, and the calender stops quickly. The "plugging" contactor remains closed only so long as the "stop-brake" button is held down, reversal being prevented by the operator releasing the button when the equipment reaches standstill. Where reversal might be serious and the operator cannot be trusted to release the button at the proper time, a friction relay may be furnished, driven from the main-motor shaft, and arranged to open the control circuit to the "plugging" contactor as soon as the motor starts to reverse.

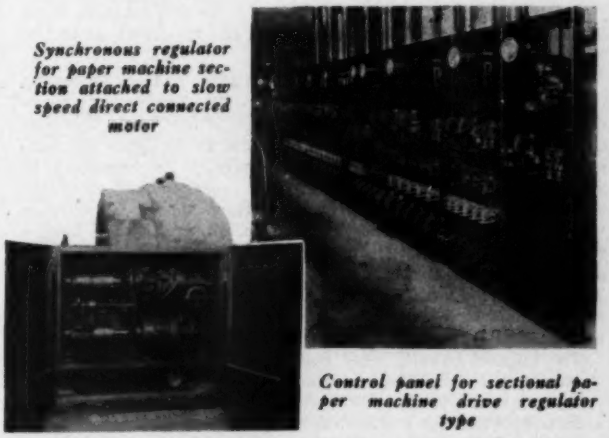
Single-Motor Dual Frequency Drive—In the dual frequency system, the small motor, back gears, and over-running clutch are omitted, and the main motor is made to operate at a low speed for threading in by impressing a low voltage and low frequency on its terminals. This means that some sort of a frequency changer is required. There are several different types of frequency changers, but one of the following would probably be used:

(A) A machine with an unwound stator and a wound rotor with slip rings and commutator, similar to the armature of a synchronous converter, but driven from an external source. Sixty-cycle power is put into the slip-ring, and the low-frequency power is taken off of the commutator. The frequency at the commutator brushes depends upon the speed at which the rotor is revolved. The driving motor has to develop only the power lost in windage and friction.

(B) A machine similar to the above, but with a wound stator. This machine drives itself, and the low frequency is varied by shifting the brushes on the commutator.

Both of the above machines are special, and the type used depends upon the rating and the conditions to be met. A transformer will usually be required to give the correct low-voltage frequency, with either type of frequency changer.

A comparison of costs with the double-motor drive shows that it is not economical to install a dual-frequency equipment unless at least 6 or 8 equipments are involved. For less than 6 supercalender equipments, the cost of the small motor, back gear, and over-running clutch is less than the frequency changer with the additional control equipment required.



Synchronous regulator for paper machine section attached to slow speed direct connected motor

Control panel for sectional paper machine drive regulator type

The operation with the dual frequency equipment is very similar to that with the double-motor equipment, except that instead of a contactor for the small motor, a contactor is required to connect the large motor to the low frequency, low voltage bus. For stopping, a plugging contactor for connecting the motor to the high voltage, high frequency bus is recommended.

Another point that must be considered with the dual-frequency drive is the fact that the large motors get very little ventilation when operating at threading speed; so they sometimes have to be modified to include special fans. In some cases, a larger frame size is required to provide the necessary heat storage and radiating capacity.

The control equipment described above in connection with the double motor and dual-frequency drives, is what is known as "semi-automatic." When desired, a complete push-button control may be furnished, providing control of speed by "fast" and "slow" buttons. On certain grades of paper, it may be advisable to include also, a "slow-down" contactor and push button arranged to give slow speed by holding down this button while a weak place in the roll of paper is going through the calender. The simple semi-automatic control is usually used, but the control may be made as elaborate as the conditions justify.

Two-Motor D. C. Drive—The direct-current two-motor drive is similar to the A. C. two-motor drive, except that the speed adjustment of the main motor is obtained by control of the

shunt field. The D. C. motor equipment is inherently more expensive than the A. C., because of the higher cost of the D. C. motor construction; and also because the D. C. motor with field control is a constant horsepower motor, whereas only a constant torque motor is required.

The control of the D. C. motor drive is very similar to the induction motor control, except that dynamic braking is used for quick stop, instead of plugging. The D. C. drive is considerably more efficient than induction motor drive at low speeds, because of the power dissipated in the secondary resistor of the induction motor. That is, for the induction motor there is constant horsepower input throughout the speed range; whereas, for the D. C. equipment, there is only constant torque input, neglecting the losses.

Therefore, the saving in power may justify the additional first cost of a D. C. equipment when the supercalender is to be operated at a low speed a considerable proportion of the time.

Single-Motor Double-Voltage Drive—The single-motor, double-voltage drive requires a separate source of power to obtain the low voltage; it usually consists of a small motor-generator set. And like the dual-frequency A. C. drive, this type of drive is usually not justified unless a large number of supercalenders are involved.

A careful study of all the conditions to be met must be made in each case before definite conclusion can be drawn as to the best type of drive.

Platers—The plater consists of two steel rolls, with means for varying the pressure between them. Equipment is required that will reverse the plater after a few turns in either direction. Reversals may be as frequent as 20 times per minute. To obtain the most efficient drive, it is necessary to select a motor that will have the minimum amount of stored energy at top speed. Therefore, motors should be selected with speeds between 450 and 600 r. p. m., and should have a rotor of small diameter and long stacking rather than large diameter and short stacking.

Slip-ring induction motors have proved very satisfactory for this service, and have been used almost exclusively, although D. C. motors have been used in a few cases.

The control usually used consists of forward and reverse contactors, a secondary contactor controlled by a friction relay connected to the motor shaft, a secondary resistor, and a master switch for controlling the reversing contactors. The motor is always "plugged" with all of the secondary resistor in the circuit; but as soon as the motor has started to reverse, the friction relay causes the secondary contactor to close, short-circuiting a section of the resistor.

A full automatic control equipment for an A. C. plater drive has recently been completed, and is now being installed. The "book" itself operates limit switches, mounted on the front and back of the table, causing the rolls to reverse automatically. These switches will be set so the edge of the book will be approximately in the center of the rolls at the instant of reversal. An indexing relay on the panel controls the number of cycles, and is adjustable between one and twenty complete cycles.

At the end of the cycle, this relay trips, and the rolls do not reverse when the book strikes the "front" limit switch, but continue to revolve in the same direction, forcing the book completely out of the rolls onto the front of the table. The operator then removes the book and puts on another book, presses a "reset" push button, which causes the indexing relay to drop back to the initial position, which reverses the rolls. The operator then pushes the book up until it engages with the rolls, and the machine requires no further attention until the next cycle has been completed. Means are provided for cutting out the indexing relay and operating the equipment by "up" and "down" push buttons when it is desired to raise and lower the table.

The full automatic control equipment described above insures uniformity of the product, due to each book being handled in exactly the same manner. Production is increased, because the operator has sufficient time between books to get the second book ready to put on the machine as soon as the first book is completed.

General Equipment

Visits to various paper mills over a term of years reveal a marked trend toward more complete electrification, and show that methods of applying electric power are going under evolution.

Along with electric power have come wholesale methods of doing things, as contrasted with former piecemeal ways that naturally carried with them high labor and maintenance costs. Electric power has enabled the paper mill more fully to utilize its own hydropower, regardless of its seasonal fluctuation or the remoteness of its location. It has facilitated the enlargement of old mills on the site, as well as the construction of new mills on more advantageous sites. It has placed at the mill's disposal, by purchase, unlimited power, with close regulation and without seasonal curtailment, because it can be drawn from great interconnected systems having storage capacities far beyond that possible for any mill that is dependent upon its own hydraulic works.

Two-foot logs have given way to the four-foot logs, and the one-man-each knife barkers have given way to the huge barking-drum, with its own motor drive and its very small fraction of a man's time per log barked. Motor-driven conveyors and stackers have replaced horses, carts and drivers. Eight huge stackers are to be seen in one mill yard, with thousands of feet of chain conveyors, all of high-class construction and with elaborate fire protection by means of high, fire-walled turret towers.

The art of wood grinding, and it is an art, has undergone rapid and radical changes with the advent of electric power. Grinder rooms are up on the general mill level, instead of down in a ravine to be handy to the water wheels—but unhandy for everything else. Today, many grinders are miles away from water power, though utilizing that power through electric transmission. Power is easier to transport than are logs and pulp. Speed and load regulation afforded by electric power, drawing as it does on many hydraulic heads, results in a better quality and more usable pulp. The first step was the utilization of synchronous motors to drive pocket grinders; then came the magazine grinders with intermittent hydraulic feed, driven singly or in pairs by synchronous motors.

The present practice makes use of magazine grinders driven by synchronous motors and fitted with motor-driven continuous feed, the rate of which is varied to hold a constant load on the driving motors. This fine load regulation is secured by varying the voltage supplied to the direct-current feed motors by means of an automatic rheostat in the field circuit of the generator that drives the feed motor. The rheostat is actuated by slight changes in the power circuit to the synchronous motor that is directly connected to the grinder shaft. As a result, the feed motors operate over wide and almost constantly changing rates of speed, to the end that the synchronous motor loads are held constant within, say 1½ per cent. In a mill having fifteen 2400- and 2800-horsepower motors driving grinders, this close load regulation assures a high quality of pulp, and is highly advantageous in respect to the monthly rates and costs of purchased power.

A mill recently visited is operating three 1200-horsepower synchronous motor-driven grinders on purchased secondary power from eleven p. m. to eleven a. m. daily. This practice gives them an extremely attractive rate for power, and five men are doing the work that formerly required thirty-five men, and employed their own intermittent and unsatisfactory waterpower in driving pocket grinders.

The feed motors before mentioned, by means of ingenious control panels, successfully execute several other duties, such as backing off log pressure for starting up, compensating for large and small stones on the same shaft, holding half load on the drive motor when one stone only is being used, jacking up the casings when stones are to be changed, furnishing continuous graphic records of the feed motor and driving motor loads.

A factor of note is the elimination of the use of beaters and jordans in the production of news pulp, which has followed the adoption of the modern methods of grinding, where, more truly than ever, "paper is made on the grindstones."

Between the grindstones and the soft stock tanks, changes are taking place in the electric drive for screens; for here we find high-speed belted induction motors giving way to slow-speed, direct-connected, synchronous motors, so arranged that there are but two bearings for each motor driven screen.

This practice insures improvement in the mill power factor, with the attendant advantages of better voltage regulation and smaller investment in distribution equipment. Floor space is economized and belts and additional bearings are eliminated. Control panels for synchronous motors have been so simplified that starting is done by push button or by hand operation, exactly duplicating that required for squirrel-cage induction motors.

A further use for synchronous motors is found in the driving of flat-box and suction-roll vacuum pumps. These have heretofore been driven by comparatively high speed induction motors through belts, gears, or chains. The new practice in Nash Hytor pumps is to overhang the synchronous motor rotor directly on the pump rotor shaft, thus eliminating the speed-reducing mechanisms heretofore used, conserving space, reducing maintenance costs, and improving power factor.

A news mill contains pumping equipment for handling 2,000 tons of liquids for every ton of paper produced; hence, much attention is paid to this great power requirement. Reciprocating pumps seem to have almost entirely disappeared from the modern mills; and the great variety of quantities, heads, and consistencies, are all handled by centrifugal pumps, mounted on common bases, with direct-connected motors. More attention is being given to the selection of pumps and motor to suit heads and quantities; for it has been found by careful survey that here is a place for practicing economy. Once in a place, the unit may look all right and it may be doing the work satisfactorily; but at the same time, the duty may be far from the best that the pump and motor might do for the same power cost. More care is therefore being given to piping, to the efficiency curves of the pumps, and to load conditions on the motors.

The passing of the back line and the adoption of sectional paper-machine drive, is of great interest and importance. This phase is being covered in a preceding section, hence, only certain related matters will be mentioned here.

Motor-driven fans and blowers as auxiliaries to paper machines are finding more and wider uses. The super-heating of ceilings over the dry end of paper machines to prevent condensation and dripping, takes a number of large motor-driven blowers. They take air through steam coils and distribute it between the false ceiling and the roof. Hot air is also distributed across the under surface of the ceiling to insure under-saturation of the moisture-laden air on its way from the dryers to the ventilators. An older mill recently visited was characterized by a profusion of large rain drops falling over the whole area from the last press to the finishing room partition, though the outside temperature was only 52° F.

Trimmings from the slitter and rewinder are now blown directly to the broke beater by motor-driven fans, while wet broke is conveyed in drop-side boxes by means of storage-battery elevating trucks. The boxes are on skids, so that the elevating truck can run under them. At the beater the box is raised so that the bottom is flush with the edge of the beater, the side is opened, and the wet broke is discharged into the beater. This greatly reduces labor cost for handling broke.

Calender stacks are now fitted with motor-operated calender-roll lifts, with push-button control. Reels and rewinders are served by motor-operated cranes, so arranged as to insure horizontal lift on the rolls and parallel motion during the transfer. Huge electric cage cranes now span machine rooms for the quick and easy servicing of the paper machines.

The electric steam generator is a comparative newcomer among paper mill applications of electricity, and it has readily found an economic place. Where power is purchased, the electric steam generator serves to fill in what would otherwise be valleys in the power consumption curve, thus relieving the boiler plant of a considerable load at times, and usually carrying all the load Sundays and holidays. Excess water power at mill-owned sites is, in some places, converted into steam by means of the electric steam generator, and coal is thus saved —often where it is very expensive.

Electricity has now come into common use in connection with flow meters, as the means of transmitting readings from the point of measurement to a convenient point of observation. The installation and intelligent use of such flow meters are important steps in effecting mill economies by stimulating effort and by making it possible to analyze costs.

Within the last few years many paper mill hydro-electric stations have been built better to utilize the power available. In one case a 45,000 kw. plant was built by a paper manufacturing company that sells all the power to a public service company. This is done to make use of what would otherwise be a dormant site, and the proceeds offset the purchase of power for other mills of the same company. A mill on a stream where there is a seasonal excess of water, has installed a "high-water generator," which operates synchronous motor-driven grinders that are seven miles away. The resulting pulp is dry stored against the lean season, thus storing up for future use water power that would otherwise be wasted. The conversion of what were directly used water powers to hydro-electric plants is progressing among paper mills in many widespread localities, enabling them to put more horsepower directly into production work than was the case before conversion.

Sale of National Forest Timber

The two largest timber sales ever offered by the Forest Service, United States Department of Agriculture, are now being advertised for competitive bids. They comprise the sale of five billion board feet of pulpwood in Alaska in the northern part of the Tongass National Forest not far from Juneau, and the other, the southern part of the forest near Ketchikan.

Conditions Governing Sales—The establishment of at least a 200-ton paper mill in Alaska with opportunity to expand to 500 tons, is required as a condition of each sale. This opportunity is in response to applications for timber and water power permits filed by a number of companies and groups of responsible individuals.

Purposes in Offering Sales—The department has several purposes in offering the sales. First of all, they are to aid in the economic development of the territory by establishing large units of a new industry, using national forest wood as its raw material. Second, they are desirous to see the industry permanent by insuring a perpetual supply of timber. Third, the offerings of Alaska timber will result in mills on American soil, using American timber, and supplying American paper users with a native instead of an imported product. Fourth, to protect these very large investments, enough timber is offered in each sale to supply a 500-ton paper mill, running 300 days a year, for fifty years. Fifth, the bidders will be protected in prices by knowing from the beginning of the sale the highest prices he can possibly be required to pay during the first twenty years of the operation of his mill, and will be further protected by a clause in the contracts that the prices fixed for any five-year period shall not make the cost of paper from Alaska mills higher than the average cost of paper of similar kinds and quality from mills in other paper-producing regions on the Pacific Coast. Sixth, there will be no possible development of a monopoly because there is room in Alaska for five or six plants with the same maximum capacity contemplated for these projects.

Scope of the New Industry—The department is planning for a permanent Alaska paper industry of at least 1,000,000 tons of paper annually. There is enough timber in each of these first allocations to supply the mills until a new crop has been grown and the provisions of the timber contracts assure regrowth after cutting. The availability of a permanent wood supply for each pulp mill is thus safeguarded. Bids for the sale near Ketchikan will be opened on April 15 and for the sale near Juneau on April 25.

The oldest active trade association of paper and paper bag jobbers in the country is actively engaged in plans for their annual banquet to be held in the Grand Ball Room of the Hotel St. George, Brooklyn, N. Y., on March 10, 1927. This occasion marks the association's tenth anniversary.

At a meeting of the association in December, a resolution was passed recommending the immediate adoption of the new price list for paper bags, and at the meeting on January 13, a resolution was passed by the association in favor of the elimination of the manufacture of flat bags.

Resins In Paper Making[1]

By JOHN CAMPBELL, Ph. D., A. R. T. C.[2]

IT IS the object of this paper to throw some light on the part played in paper making by the resins in wood. To the papermaker, the sticky material associated with some wood pulps is known as pitch, and it is this material, which, I believe, is a mixture of fat and rosin, that I am going to talk about.

Before proceeding further, I wish, first of all, to discuss the physical properties of pitch, or resin. Pitch is a substance which, in large pieces, does not dissolve in water. It belongs to a very large category of substances, like rubber, tar, oil, and butter, that refuse to mix with water. These substances were, at one time, believed to be quite insoluble in water and could not, for practical purposes, be made to dissolve. Within comparatively recent times, however, means have been found to obtain these substances in what may be termed a colloidal solution in water. This is done by dividing and subdividing these insoluble substances into particles so small that they cannot be seen by the eye. Such a suspension in water, when viewed by transmitted light, appears opalescent or milky. If the particles are very small, then the suspension might appear to the eye like a true, perfectly clear solution of, say, salt water; but even so, the particles might be identified by the aid of the ultramicroscope.

It might be said here that the only difference between a true solution, such as salt and water, and a colloidal solution of butter and water is the difference in particle size, the salt particles being, of course, very much smaller than the fat particles. Examples of colloidal solutions are milk, which has fat particles in water; milk of rubber, from which the ordinary rubber is prepared by coagulation, or the colloidal solution of rosin in water, which is now being put on the market for sizing paper.

A colloidal solution of a substance is by no means always stable; that is to say, under certain conditions and by the addition of certain substances, the particles may coalesce and grow so large in size that they separate entirely from the water medium. A good example of this is the clotting of milk in warm weather. There are certain substances, however, known as protective colloids, such as glycerine, casein, sugar, gelatine, etc., which tend to prevent particles gathering together; in other words, they tend to stabilize the colloidal solution.

In the preparation of a colloidal solution in water, in order to assist in the subdivision of the particles by grinding or heating, certain substances are added, called peptisers or dispersers. These substances assist in the wetting of the particles by water and in giving them an electric charge of positive or negative electricity, thus causing the particles to repel each other in exactly the same manner as two north or south poles of magnets repel each other.

Let us now apply this knowledge of resin to the sulphite cooking process. Here spruce wood chips and maybe jack pine chips, containing resin, are heated in acid liquor, in order that the chips may be properly cooked, the calcium bisulphite liquor must penetrate into the chips; now, at the temperature of penetration, the resins in the wood become liquid, like an oil, and as everybody knows, water will not wet oil; so the acid liquor will penetrate the chips only with difficulty. If, however, a substance be added to the bisulphite liquor which will increase the wetting of the resin by the water, then the acid liquor will penetrate more readily, and the amount of uncooked chips at the end of the cook will be greatly reduced. Certain paper mills are adding substances to the acid liquor; and, although they know that these substances assist in the cooking of the chips, still the mechanism of their action has been unknown; for example, in the Serlachius cooking process, 185 lb. of caustic soda are added to 29,000 gallons of strong cooking liquor. This small quantity of soda is, of course, immediately neutralized by free acid, so that the liquor although still strongly acid, now contains sodium bisulphite, which has the property of increasing the wetting of the resin by the water, and a better penetration will now take place. Other sodium or ammonium salts have the same action; for instance, common salt, washing soda, or ammonium chloride. There are also certain sulphonated organic compounds that will also assist the water to wet the chips, and thus reduce the time of penetration and also the amount of tailings.

In Table I and Fig. 1 are shown the rates at which ether-soluble pitch is wetted and dispersed in a calcium bisulphite solution, with and without a portion of the combined lime replaced by soda. In this experiment, exactly the same amounts of pitch were weighed out into shaking bottles, and equal volumes of the respective solutions added to each. The bottles were then placed in a shaking apparatus, and the rates at which the pitch was dispersed were measured. As seen from Fig. 1, the rate of wetting and dispersing was much greater in the case of the acid solution in which a portion of the lime was replaced by the soda. In Table II and Fig. 2, is shown the increase in rate of wetting and dispersing of pitch due to the addition of Turkey red oil to the calcium bisulphite solution.

TABLE I

Dispersion of Pitch by Cooking Acid Liquor

Time	Free SO_2	SO_2 combined with calcium	SO_2 combined with sodium	Pitch dispersed
1 hr.	2.84%	1.09%	Nil	nil
	2.84%	.90%	.17%	nil
2 hr.	2.84%	1.09%	Nil	.0140 g.
	2.84%	.90%	.17%	.0180 g.
3 hr.	2.84%	1.09%	Nil	.0240 g.
	2.84%	.90%	.17%	.0325 g.
4 hr.	2.84%	1.09%	Nil	.0285 g.
	2.84%	.90%	.17%	.0340 g.

TABLE II

Dispersion of Pitch by Turkey Red Oil in Cooking Acid Liquor

Time	Free SO_2	SO_2 combined with calcium	Turkey red oil	Pitch dispersed
1 hr.	3.00%	1.00%	0.093%	0.0045 g.
	3.00%	1.00%	nil	0.0040 g.
2 hr.	3.00%	1.00%	0.093%	0.0220 g.
	3.00%	1.00%	nil	0.0110 g.
3 hr.	3.00%	1.00%	0.093%	0.0290 g.
	3.00%	1.00%	nil	0.0200 g.

In the paper mill, the troublesome nature of pitch is more apparent than in the sulphite mill. Its occurrence here is somewhat seasonal, and it usually makes its appearance only in warm weather, when it tends to stick to the wire, press rolls, and felts. Many theories have been advanced as to why it should appear during the summer months. Some say it is due to cooking the chips with a high combined acid, produced by the use of warmer water in the acid towers; others attribute it to the softening of the pitch coming from both the sulphite mill and the grinder room during this season.

In Finland, pitch troubles are believed to be due to insufficient lime in the raw water. By the addition of lime, Engineer Jarl Enckell was able to prevent pitch troubles, as reported by him in Pappers och Travarutidskrift No. 20, Oct. 31, 1924. The reason for the addition of an alkali like lime, was based on the work done by Lorenz on the sizing of paper by resin size. The mechanism of the action was considered as follows: It was known that cellulose fibers and rosin particles were charged with negative electricity, so that these two substances repelled each other in a suspension in water. It was known that aluminum hydroxide was charged positively, so that on the addition of alum, the aluminum hydroxide that is produced by its decomposition, is attracted to the fibers and covers them, thus giving the fibers a positive charge of electricity. This positive charge of electricity on the surface of the fibers now attracts the negatively charged rosin particles, which, in turn, cover the aluminum hydroxide on the fiber surface; in other words, the aluminum hydroxide acts as a cementing material to hold the rosin particles on the surface of the fibers.

Let us now examine sulphite pulp coming into the paper mill. Owing to the difficulty of thoroughly washing the pulp in the blow pits, this pulp carries with it small quantities of sulphite liquor. This liquor contains pitch in colloidal

[1]Paper read at the Annual Meeting of the Technical Section of the Canadian Pulp and Paper Association, Montreal, Jan. 26-27, 1927.

[2]Research Director of the Abitibi Service Division, Abitibi Power & Paper Co., Ltd., Iroquois Falls, Ont.

solution, which tends to accumulate in the white water in the wire pit. In order to minimize pitch troubles, it has been found expedient to add a certain proportion of alum to the mixed stock going to the paper machines; but even with alum, there is a certain amount of pitch trouble in the summer months.

In order to obtain some further knowledge of the pitch, it was decided to try out Enckell's experiment during cold weather. Accordingly, pure hydrated lime was added to the sulphite stock in the decker chest until the acid value of the

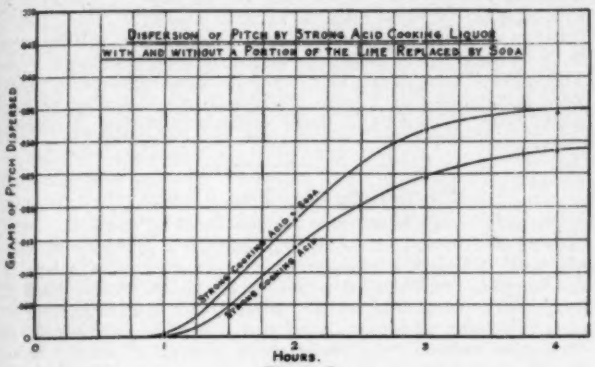

Dispersion of Pitch by Strong Acid Cooking Liquor
with and without a Portion of the Lime Replaced by Soda
Grams of Pitch Dispersed
Strong Cooking Acid + Soda
Strong Cooking Acid
Hours.

Figure 1

associated water had a pH value of 8.5. It should be explained here that anything greater than a pH value of 7 is alkaline; or, in other words, it will exhibit the properties of excess caustic lye proportional to the pH value. Anything below 7 shows the presence of excess acid. The lower the pH value the greater the concentration of acid. At this value of 8.5 the sulphite stock was discolored brown. Alum was next added to the mixed stock until the pH value was 5.6. A short time after the stock reached the machines, pitch began to gum up the press rolls just as it would have done in warm weather, and it was just as sticky. An excess of alum was then added until the pH value of the mixed stock was 4.3.

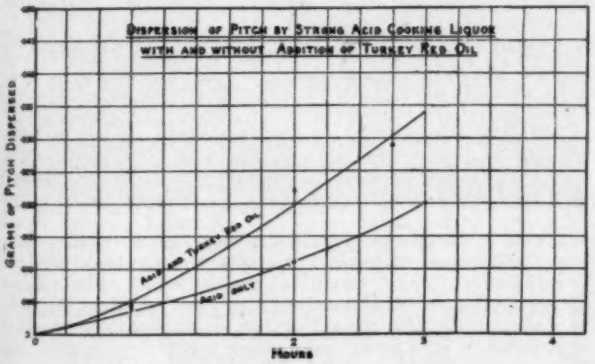

Dispersion of Pitch by Strong Acid Cooking Liquor
with and without Addition of Turkey Red Oil
Grams of Pitch Dispersed
Acid and Turkey Red Oil
Acid only
Hours

Figure 2

After some time, it was noticed that the press rolls became less sticky, until finally stickiness disappeared. The value of this experiment showed: (1) that the pitch had sticky properties in the winter as well as in the summer; and (2) that the acidity of the stock was an important factor in causing the formation of pitch on the press rolls.

The second experiment that was tried was the effect of temperature on stock containing alum on the machine. Accordingly, the water associated with the stock was heated up, and immediately pitch began to settle out on the press rolls. However, on removing the source of heat the pitch gradually disappeared. This experiment showed that temperature alone has an influence on pitch formation.

On carefully studying the two above experiments, and keeping in mind a predetermined experimental fact that acid alone tends to flocculate pitch in colloidal solution, the conclusion arrived at was, that the rate of coagulation of the alum in the white water into aluminum hydroxide and acid, was the main factor governing pitch formation. The rate of coagulation of alum in the paper-mill white water, is increased by temperature and decreased by increase in acidity of the white water. Therefore, of course, the rate of coagulation of the alum must increase as the acidity reduces to a pH value of 7. From this it was deduced that the mechanism of pitch formation is as follows: The alum decomposes into aluminum hydroxide flock; this flock acts as a scavenger in the white water; in forming, it removes the pitch particles out of colloidal solution. When the rate of decomposition of the alum is rapid, these flocks are large, and will form throughout the whole mass of white water. The tendency is for the pulp on the wire to filter off the flock, which will then lie on the top of the wet sheet; and as the sheet passes under the rolls, the flock is compressed, so that the pitch oozes out and adheres to the surface of the rolls. In cold weather and with high acidity, the rate of coagulation, or decomposition of the alum, is slow. An extremely small powdery flock is formed, which mixes with the pulp and does not lie on the top of the sheet.

Enckell's results showed that the Finnish waters did not contain sufficient lime even to start the decomposition of the alum, so that pitch accumulated in the white-water system, just as if no alum had been added.

Summary

1—The effect of resin in wood in preventing the penetration of the strong cooking acid into the chips, is pointed out; ways are shown in which better penetration may be obtained by the addition of certain salts which, under conditions in the digester, will, of themselves, or may, decompose to salts, which increase the wetting of the resin by strong cooking liquor.

2—Pitch troubles in the paper mill are discussed, and it is shown that the formation of pitch on the paper machine is governed by the rate of decomposition of alum; such being the case, pitch troubles in paper mills using alum can be prevented in the summer months by regulating the rate of decomposition of the alum, either by cooling the mixed stock before the addition of alum, or by adding the requisite amount of an acid, for example, sulphuric acid, or else an acid salt, such as excess alum, or acid sulphate of soda.

This paper is given by the request of L. R. Wilson, managing director of the Abitibi Power & Paper Company, Ltd.; and it was through the efforts of J. E. Patterson, mill manager, that most of the experimental work in the mill was carried out so successfully.

Largest Show-Window Forest Gift

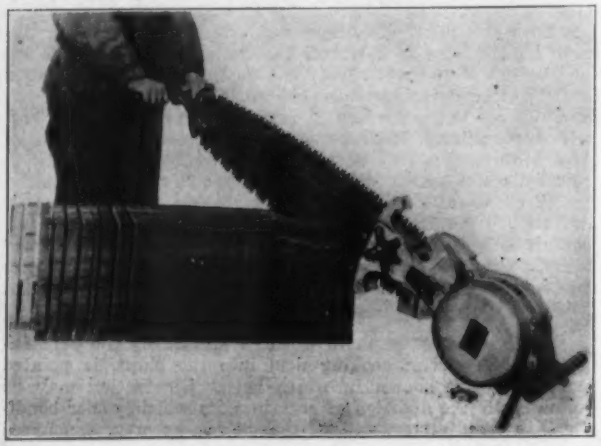
Syracuse University is the recipient of a demonstration forest gift from the Charles Lathrop Pack Forestry Trust, founded by Charles Lathrop Pack of Lakewood, New Jersey, president of the American Tree Association. The gift is in trust to the University for the use and purposes of the New York State College of Forestry and will be the largest demonstration forest in the United States. Situated on the main automobile route between New York and Montreal, north of Glen Falls, in the well known and beautiful Lake George section of the Adirondacks, the property extends more than two miles on each side of the main highway and lies between Lake George and the Hudson River on which it fronts. It contains some of the finest specimens of virgin white pine remaining in the East.

Mr. Pack, for many years an active leader in economic forestry, determined that such a "show-window forest," situated on the main highway and comprisjng a model forest in all phases of development from baby trees in their beds, to mature growth, would serve not only for public education but would furnish an area for practical work in the woods by students of forestry. The forest is to be given over to scientific forestry management including re-forestation in all its phases, with particular attention to the evergreens and softwoods, important to the state's future timber supply. Undoubtedly, this outdoor museum exhibiting forest operations in all details, will be a most unusual sight-seeing feature along the main highway serving to attract many thousands of visitors.

A Portable Chain Saw

To meet the demand for a mechanical saw to fell trees, in construction work, or for use in pulp mills, etc., Reed-Prentice Corp., has developed the Wolf Portable Chain Saw, shown in the accompanying photograph. The machine, which is available for the present market in 24-inch capacity, is regularly supplied with reversing and foot control switches; is portable, and can be readily handled by one man, although a double saw for operation by two men can also be supplied.

The blade, 24-inch diameter, is made of two pieces of saw



steel with spacers forming a groove in which the diameter teeth travel, and has provision made for oiling the groove through reservoir in spacers. The gear case is packed with heavy grease and gears are made of steel, except the intermediate, located between the main drive gear and motor pinion, which is of bakelite to insure quiet operation.

The machine which weighs 83 lbs., has shafts hardened and ground, running in ball bearings, with a ball bearing motor 1½ h. p., 1800 r.p.m., to suit standard voltages. Chain teeth may be operated in either direction by means of reversing plug switch, and can be stopped or started by a foot control switch. The saw can be reversed to use the other set of teeth before re-sharpening, and the top section of chain teeth is regularly supplied with a guard to protect operator and the saw teeth from injury.

Annual Meeting of S. A. P. I

The annual business meeting of the Salesmen's Association of the Paper Industry will be called to order on Tuesday, February 22, at 10:30 a. m., in the East Room of the Waldorf-Astoria. Following routine business there will be an address on "Advertising" by a representative of one of the largest advertising firms in the country, covering phases of particular interest to paper salesmen.

The annual banquet will be held in the Roof Garden of the Waldorf in the evening. There will be an after-dinner talk by Rev. H. P. Silver, D.D., followed by a big dance to a ten-piece orchestra.

For the last few years the Salesmen's Banquet has been a stag event. This year, in response to requests of many members, the banquet is being made more of a social event and the ladies are therefore invited. For this reason the association is having an inspirational address by Dr. Silver, but no other after-dinner speaker.

Cost Accountants at the Big Convention

In connection with the annual meeting of the American Paper and Pulp Association in New York during the week of February 21-25, the Cost Association has planned a special luncheon meeting for executives, at which Col. B. A. Franklin will preside, and which will be attended by President Norman W. Wilson and Executive Secretary H. P. Baker, at noon on Tuesday, February 22.

An interesting program has been arranged. The speakers will be Freas B. Snyder, president, Brotherhood of Locomotive Engineers, Title & Trust Company, Philadelphia, and vice-president of the Robert Morris Association, who will discuss "The Credit Problem." Prof. Thomas Henry Sanders, of the Graduate School of Business Administration, Harvard University, will speak on "Relation of Cost to Selling Prices," while Paul S. Hanway, statistician, American Paper and Pulp Association, will take for his topic, "The Use of Statistics for Budget Purposes."

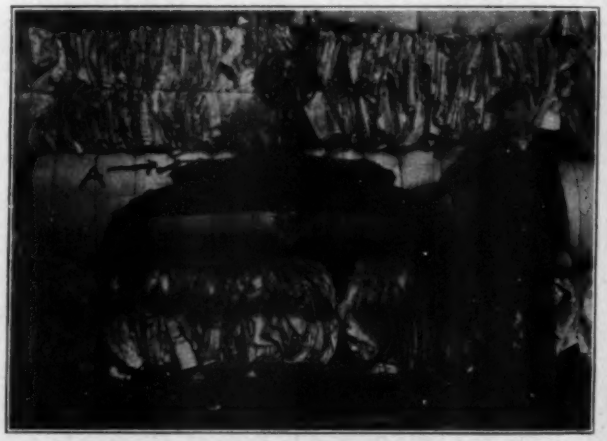
Those desiring to attend this luncheon meeting, to which all are cordially invited, should notify Thomas J. Burke, secretary-treasurer, Cost Association of the Paper Industry, 18 East 41st street, New York, as early as possible.

Other speakers at the sittings on the same day will include D. A. Wilcox, cost accountant, Oxford Paper Company, New York, whose subject will be "Paper Machine Efficiencies," and Reed B. Timmers, of Albany, N. Y., who will tell what he has been doing for pulp and paper mills in reducing insurance costs.

New Bale Handling Device

The Mansaver Grab, a new device offered by the J. B. Engineering Sales Co., of New Haven, Conn., will bring about considerable saving and elimination of torn or broken bales, in the handling of bales of paper, rags, hemp, waste, burlap, boxes, etc. Weighing 200 lbs., it has jaws of spring steel to absorb shocks, and these jaws are protected and joined at their tips reducing the pressure at any point on the bale. The shafts are steel, and all castings of steel or malleable iron.

Three men are required for manipulation, one in the crane, one on the floor to guide the grab, the other on the pile, and its use will enable increased storage capacity, permitting the



bales to touch on the sides and almost touch on the ends, and stack almost within one bale height of the crane bridge. A self-locking lever A (see illus.) grabs the bale at both sides in one motion, reducing handling time, so that when the bale is placed on the pile, the self-locking level slips into position and is ready for another bale. Once placed on the pile, the bale can be picked up from the same place with no other handling.

Poster Competition Should Attract Safety Directors

Announcement is made of the fourth educational graphic arts exposition to be held in Grand Central Palace, New York City, from September 5-17, 1927, and a poster contest that should draw response from the allied industries of America. The design must be original, and there is no limitation of subject in the design. This latter ruling should bring out some very interesting posters on safety from our directors at the mills, to stimulate the promotion of safety in the industry countrywide.

Two hundred and fifty dollars is offered for first prize; $100.00 for the second, and $50.00 for the third. Five of the contestants will receive honorable mention as well.

For details of this contest write to the Secretary, Poster Design Competition, Art Alliance of America, 65 East 56th Street, New York City.

Neutral and Alkaline Sulphite Cooking

Many Endeavors Made to Substitute Soda or Ammonia for Lime and Magnesia in the Sulphite Process

THE attempts which are being made at present to cook by means of some modification of the sulphite process hard and resinous woods, cereal straws and other hitherto more or less unpulpable cellulosic raw material should be of the greatest interest to all producers of pulp and paper throughout the world. Hence Dr. J. Hausen, of Berlin-Friedenau, has done a serviceable thing in bringing together for publication and comment in the *Papierfabrikant* of November 7, 14 and 21, 1926, a most comprehensive summary of contributions to the literature of the subject, including synopses of patent specifications. Of this difficult technical article in German, filled, like some of the patent specifications, with "extraordinarily varied and configured proposals," Arthur Pollak has made an admirable translation, the text being followed so closely as to make it read like an original.

As pointed out by Dr. Hausen, the idea of using soda and other alkalies, ammonia included, as bases for sulphite liquor, is as old as the sulphite process itself, and it has been a subject of much controversy in the patent literature as well as in professional papers. Three main groups of methods are studied by him. The first group covers all those methods in which a distinctly acid procedure is maintained, and in which alkalies or ammonia are utilized as the double sulphurous acid salts or with a surplus of sulphurous acid. The second group embraces those methods in which the cooking agent is neutral alkali or ammonium sulphite, with either insufficient sulphurous acid to completely convert it into bisulphite or with a surplus of alkali. In between these two groups are processes which make use of neutral sulphite without admixture. Finally, as a third group there must be mentioned those methods employing a most acid liquor, and which have the alkali earths, and also, in greater or lesser amounts, alkalies as bases.

Acid Cooking Methods with Alkalies as Bases

The oldest sulphite method with alkali as base is laid down in an American patent[1] of the year 1851, concerning which Schindler, 1884, tells us. The patentee soaks straw in soda liquor and treats the penetrated material, after draining, with sulphurous acid, namely, with the vapors from sulphur burners. He asserts that a surplus of SO_2 accelerates the cooking and converts the incrusting substances, as well as coloring matter, into a form which can be washed out with water. The same idea was taken up later by Archbold and protected for him by an American patent.[2] He employed, in contradistinction to his predecessor, a higher pressure during the SO_2 treatment.

Tilghman's and Kellner's Discoveries—It appears doubtful that the foregoing two-phased methods ever attained industrial application, since the interest of pulp chemists of that time turned to the single-phase cooking process developed by Tilghman and his followers. Tilghman protected with his patents[3] the cooking of cellulose bearing materials with sulphurous acid and with the admixture of sulphites. He held the addition of the sulphurous acid salts of lime, magnesia or sodium to be very desirable, because the free fibers could be bleached much brighter and more easily than by the use of sulphurous acid alone.

Kellner, to whom the Tilghman patents were unknown, discovered sulphite cooking by a cook with sodium bisulphite liquor.[4] He was occupied with the problem of regenerating the black liquor from alkali cooking by passing in sulphurous acid followed by causticizing with lime. Through an oversight on the part of his laboratory assistant, Anton Haller, one batch was cooked with the uncausticized—i.e., bisulphite-containing—liquor instead of the regenerated. From this it was found that in this manner a good, well-bleached, and, above all, stronger pulp could be produced than could be attained by means of alkaline cooking. Since it was known that acids contracted cell membranes, the discovery did not astonish them.

Then when Kellner as well as Tilghman subsequently replaced the sodium with lime and magnesia salts, this was done solely because of their comparative cheapness. Whatever differences in cooking results that could be ascribed to the nature of the substituted bases appear to have been ascertained neither by these experimenters nor by Mitscherlich. The first who asserted such distinctions was Ekman. Ekman recognized[5] that magnesia and sodium, different from lime, possessed certain favorable properties that would make it appear that their substitution for lime was desirable. He mentioned particularly the greater solubilities of the sulphites and sulphates of these bases, because of which impurities of the pulp from insoluble sulphites and sulphates, as with lime, were not present. He also ascribed to magnesia a greater penetrative power upon the incrusting substances and asserted that pulps so produced were softer and whiter than those obtained with calcium bisulphite. Sodium, according to him, possesses the same properties that make magnesia appear more desirable than lime even to higher degree, but yet that it is too expensive to be of use industrially—a reason which caused Ekman to concentrate upon the application of magnesia bisulphite liquors. The pulps thus produced, marketed by him in the middle '70's, are said to have surpassed those of Mitscherlich in purity and whiteness.

Ammonia as a Base—The favorable action of alkalies in the cooking process on one hand, and the difficulties of their recovery from their liquors on the other, led to a study of that alkali, which because of its volatility, could most readily be recovered from its liquors—ammonia. Of the many sulphite processes with ammonia as base, only one belongs to the group here considered, and at that, only partly. Masurawa protected in several patents[6] the cooking of wood, bamboo, or other fibrous materials with solutions of ammonium bisulphite or ammonium sulphate and sulphurous acid. As a great disadvantage of the lime bisulphite process he points out that with higher temperatures there occurs a precipitation of calcium sulphite and gypsum on the surface of the chips, which hinders uniform penetration and produces uneven cooks. In general, as the cooking liquor was decomposed, the hydrogen ion concentration rose, whereupon the fibers become brittle and the yield decreases. In order to avoid these evils it is necessary to cook at a comparatively low temperature, but for a decidedly longer time. Higher temperatures and shorter cooking times may be obtained, however, by the use of ammonium bisulphite. This last is stable and offers no disadvantages even at high temperatures. Cooks can thus be finished in a short time and a better product is obtained than with calcium bisulphite liquor. By certain changes in the procedure pulps may be obtained with definitely desired qualities, as, for instance, kraft pulps. The active agents of the cooking liquor are the HSO_3 ion and the H ion. The concentration of the latter does not exceed a certain limit during the entire cooking process, owing to the buffer action of the salts present. Because of this the tenderness of the fibers, or the feel of the pulp, is improved.

The strength of the liquor to be used depends upon the noncellulosic content of the raw material, and the composition of the liquor upon the qualities desired in the pulp produced. Thus, for example, to obtain a light colored pulp ammonium bisulphite alone is employed; to produce an easy bleaching pulp, an admixture of SO_2 is requisite, and, in fact, in such a concentration that to every 1.5 to 3 molecules of salt there

[1] Papierzeitung, 1884, S. 1927.
[2] U. S. patent 274,250 (1883).
[3] U. S. patents 70,487 and 99,229 (1867); Brit. pat. 2924.
[4] Kellner, Papierzeitung, 1885, S. 233.
[5] Hofmann, Papierfabrikation, 1897, S. 1511.
[6] Jap. patent, 31,941; U. S. A. patent, 1,244,525 (1897).

is 1 molecule of SO_2. An excess of SO_2 over this amount is disadvantageous. For the production of kraft pulp neutral sulphite is added to the bisulphite in the proportion of 1 molecule : 0.2 to 0.3 molecule of neutral salt. In this case one has what is decidedly a sulphite process with a higher base content, something often mentioned in patent literature. The hydrogen ion concentration in these three cases is fundamentally different. At room temperature it amounts to, in the first case, to 1/1000 molecule per liter; in the second, 2/100 molecule per liter; and in the third, about 1/100,000 molecule per liter. The temperature requirements and times of cooking are also varied. In all cases there is a two-hour cooking at 110° in order to facilitate complete penetration of material. The length of the final cooking depends upon the temperature and amounts, in the first case, to two hours at 160°; in the second case, to ½ to 1 hour at the same temperature. In the third case the cooking is done at a temperature of 180° and takes somewhat longer than in the first two cases. In the first case there is obtained a pulp with more than 90 per cent pure cellulose; in the second one, with 97 per cent pure cellulose. In the third case a bleached, very strong pulp, containing about 15 per cent noncellulose matter, of the nature of kraft pulp, is obtained with a yield of 60 per cent.

Concerning how and in what circumstances this method entered into practice there is nothing known. On the economic side, the question of ammonia recovery is, of course, of paramount importance. Although this recovery appears to be essentially simpler than that for the fixed alkalies, yet one must not forget the fact that the distillation of the liquor with lime necessitates a considerable expenditure of heat, for the liquor must be concentrated to at least one-third its original volume in order to recover a sufficient quantity of ammonia. Concerning the technical side of the actual cooking method, it cannot be denied that there is much in favor of the possibility of controlling the cooking liquor and producing a desirable pulp by reason of the high solubility of the sulphite. Certain cooking liquor combinations, as, for instance, those with high base content, cannot be attained at all when lime is used as the base. Whether, on the other hand, the buffer action of ammonia salts surpasses that of calcium salts, remains uncertain. Conductivity measurements of this sulphite liquor establish, however, that the hydrogen ion concentration does not change appreciably during a cook.

Furthermore, it must not be overlooked that a specific action, which has a beneficial effect on the lignocellulose complex must be ascribed to the ammonia. This is known from the research of Cross and Engelstad, who investigated the effect upon the results of the cook of the addition of various bases to sulphurous acid. These experiments showed a series of interesting results, which are briefly gone into here. These experimenters had shown in a previous work[7] that cooking with sulphurous acid solution (6 to 8 per cent), the limit of the delignification, was a condition in which there were free fibers, but that these held lignin. These fibers require a large amount of chlorine to bleach; but this difficulty might be obviated by the addition of bases, since these bases react with the aldehydic or ketonic carbonyl groups of the lignocellulose. They then undertook a series of cooks to establish the relative effect of the various bases. The results arrived at by the use of liquors whose total sulphurous acid content was within that of industrial practice (5 per cent) are especially interesting. The addition of base was at all times adjusted so that only about 1/5 of the total SO_2 existed in the combined or semicombined form. The nature of this process was then really a mean between the technical sulphite process and a pure sulphurous acid process. The effect of the addition of bases was distinctly noticeable, and there were certain gradations according to the nature of the base added, which may be summed up as follows:

Upon the addition of equivalent amounts of ammonia, soda, lime, or magnesia, maintaining all other conditions constant, the favorable effect of the bases upon cooking occurred in the following order: The yield with magnesia was lowest, being 30 per cent (on the original weight of the wood). With lime it was 35 per cent, with ammonia and soda it reached nearly 50 per cent. The degree of cooking, obtained by determining the amount uncooked, gave relative results. After 24 hours' cooking at 110° degrees, with a solution of 5 per cent SO_2, with the addition of 2.5 grams ammonia per liter and respectively equivalent amounts of soda, lime and magnesia, the uncooked portions were—

With ammonia	1.3 per cent
With soda	5.2 per cent
With lime	9.6 per cent
With magnesia	21.6 per cent

All based on original weight of wood.

Summary of Early Experiments—In these preceding experimental results appears for the first time, in my opinion, an exact experimental account of the specific action of the various bases in the sulphite process. It shows that ammonia has, by far, the strongest action and that lime as base acts more desirably than magnesia. Added in small amounts to sulphurous acid, magnesia does not, to anything like the same extent, show the advantageous properties, which, according to the opinions of Ekman mentioned above, it possesses when added in normal amounts. The reason for this may well be taken to be that with such a large excess of SO_2 (as above), the difference between the solubilities of the neutral sulphites causes no appreciable effect upon the pulp, as is the case with normal liquors. Much more apparent is the specific action of salts on the lignin complex. This action is strongest with ammonia. The authors assume that they are dealing, in part, with a catalytic effect, but there is also an addition of ammonia to the carbonyl group. Aniline and phenylhydrazine, on the other hand, which react with these groups with elimination of water, inhibit the cooking completely.

Cross protected the above described process in an American patent[8] in which the following cooking conditions are given: As liquor, a sulphurous acid solution of 6 to 7 per cent SO_2 is used, with the addition of 0.25 per cent ammonia (based on weight of the liquid). Six parts of liquor are taken for one part of wood. In four hours heated to 100° and kept for two hours at this temperature. In another hour 110° is reached and this temperature is maintained for 15 to 18 hours. In this way a readily bleachable pulp should be obtained from spruce with a yield of 51 to 53 per cent.

Concerning experiences with the technical manipulation of the method, one manager writes: "It became quiet clear that sulphonation is much more penetrative with this method than with the usual sulphite process. Using the same temperature and total concentration of SO_2 the dissolving power of the liquor is much more thorough and the defibrination of the raw material to pulp is much more thorough, as is evidenced by a minimal amount of screenings. Moreover, the wash waters from the pulp are much more free from fibers, from which we conclude that the fibers have retained their original length, being unattacked. The fibers stick together somewhat in the shape of the original chips, but break up upon washing, to an exceptionally bright pulp. Bleaching shows a favorable behavior on the pulp, only one must be careful to prevent overbleaching. (Conversion to oxycellulose)."

Concerning the practical value of this process nothing further has become known. In any case, the yield is not appreciably higher than that with the usual sulphite process. Whether or not the better quality of the pulp produced warrants the higher consumption of base, the recovery of which, in view of the small quantities added, surely could not pay, cannot at present be decided because of insufficient data from practical mill results.

It must be mentioned here, however, that according to a statement from Schwarz[9] during the war several pulp mills who, lacking sulphur, were unable to acquire pyrites burners in time, cooked with sodium bisulphite for a time. This was received from chemical plants as a 25 per cent solution or as the solid product. However, in the opinion of the author, the comparatively high price of the sulphite in contrast to Sicilian sulphur and pyrites eliminates the consideration of such practice in normal circumstances.

According to accounts from Blasweiler,[10] during the war in the utilization of war wastes straw was cooked to kraft pulp

[7] Jour. Soc. Chem. Ind., 43 (1924) T. 253f.

[8] U. S. patent 1,547,907 (1925).

[9] Die technische Herstellung von Zellstoff, Halle a.d. S. 1922.

[10] Papierfabrikant, 1923, S. 375.

by means of sodium bisulphite as devised in experiments by Dr. Kühle in Pfungstadt (Hessen). The results were not satisfactory, so that this process found no industrial application at that time. However, at present several mills are cooking straw with sodium bisulphite liquor.

For the sake of completeness, another process by Schulte[11] for the production of half-stuff must be mentioned. Here wood is soaked with sodium sulphite and sulphurous acid and thereupon cooked with steam. The resulting pulp is intended to serve as a substitute for groundwood.

This exhausts the important published accounts concerning the sulphite or SO_2 process with alkalies or ammonia as bases.

Methods Employing Neutral or Alkali Sulphites

Into this group fall those methods which occupy a position in between the distinct sulphite process and the alkaline methods, be they liquors with higher base content, or be they neutral or alkaline liquors.

The alkalies have the advantage over lime and magnesium of possessing easily soluble sulphites. One can, therefore, by their use prepare cooking liquors with insufficient sulphurous acid to completely form the bisulphite; or in other words, the base content can be raised.

The oldest method of this kind is mentioned as Graham's.[12] In this method the cooking is done with neutral sulphite until gases contained in the raw material are displaced, and then gaseous SO_2, or a water solution of it, is led in in such amount that there is not enough to form the bisulphite completely. In this way the fibers are supposed to be protected from the harmful effects which might otherwise be caused by the precooking when volatile matter or gas forming substances are existent in the wood.

From other considerations Schwalbe[13] arrives at a similar proposal. He refers to the work of Tiemann,[14] according to whom the addition of neutral sulphite to doubly bonded organic matter sets free alkali, which must be recombined to permit a further addition of the neutral sulphite to organic matter. This Schwalbe sought to do by means of semi-combined SO_2 added in such amounts as to correspond in its stoichiometric value to the alkali that is set free. By means of this method, because of the absence of strong acids or alkalis, one should obtain white and unattacked pulps with high yields. As practical examples there are mentioned the cooking of wood or straw with a 5 per cent solution, made up of two parts sodium sulphite and one part sodium bisulphite, at 5 to 7 atmospheres pressure; and also, the soaking with 10 per cent neutral sodium sulphite solution and subsequent steaming in a CO_2 atmosphere under 6 atmospheres pressure.

There is nothing mentioned as to if or in which circumstances during the cooking the continually generated organic acids are able to disturb the neutrality of the liquor.

Scholz, Posanner and von Halle[15] propose the use of a sulphite liquor with a base content 3 to 4 times higher than that of the usual liquor for the cooking of ripened fibrous materials, as hemp, jute, bagasse, tobacco stalks, etc. The cooking with the above mentioned liquor follows an alkaline cooking. It is stated that the production of pulp from the fibrous materials named by the use of the usual sulphite liquor is not possible.

For the cooking of red beechwood, which may be distinguished from the other varieties of wood because of its difficultly soluble incrusted matter and its high content of coloring matter, C. A. Braun[16] proposes the use of calcium, magnesium, or alkali bisulphite liquors with 40 to 60 per cent combined SO_2. By the observance of certain precautions light-colored and readily bleachable pulp is obtained.

Neutral Alkali Sulphite Cooking—Between the alkaline and acid cooking processes there is the cooking with neutral sulphite. Because of the limited solubility of the calcium, and to a certain extent the magnesium, sulphites, this can only be done with alkalies as bases. The cooking liquor is weakly alkaline, nearly neutral; but contrary to the alkaline sulphite process, HSO_3 ions are formed, which accelerate the cooking. It is not to be doubted that cooking with neutral sulphite does not proceed so rapidly as with ordinary sulphite liquor, and for this reason more stringent cooking conditions are necessary. However, the desired neutrality of the liquor is not persistent throughout the cook. Because of the resulting acids the liquor develops an acid reaction. For this reason with many methods the alkali sulphite liquor is made alkaline from the start. The discussion of these alkaline methods will be appended to the consideration of neutral alkali sulphite cooking.

The cooking process with neutral alkali sulphite was first described by Cross[17] about 1880. He ascertained that the hydrolytic action of neutral salts was weaker than that of bisulphite and that because of this successful cooking required temperatures of 160° to 180°. He believed that the sulphite was consumed by addition to the lignocellulose comulex, since the base from acid groups becomes bound to the most acid of the aldehydic or ketonic groups.

It may be assumed that Cross's modification of the sulphite process was prompted largely by the difficulty of properly lining digesters in the acid process. No technical application of this process, worthy of mention, so far as is known, was made.

The Braun Patent—A neutral sulphite method with ammonia as base was patented by C. A. Braun.[18] According to this method a solution of 1 to 3 per cent SO_2 is completely neutralized with ammonia. The cooking is done in closed, indirectly heated digesters for 10 to 24 hours at 4 to 10 atmospheres pressure, and is supposed to yield a very light-colored, easy-bleaching pulp. Even highly-colored fibrous matter like jute is, after cooking, light-colored and readily bleachable, giving a strong fiber very suitable for the manufacture of paper. According to statements by Dieckmann[19] there is a good yield. This really promising process has, so far as is known, not yet been applied on a large scale.

A modification of this method is made in the process of C. F. Sammet and J. Merrill,[20] according to which fibrous materials are treated with gaseous ammonia and gaseous sulphurous acid with heating by direct steam. As decided advantages of this process the small volumes of liquor are referred to. This makes for decreased steam consumption for heating and facilitates the recovery of chemicals from the liquor. The gases are let into the digester together with steam, either continuously or intermittently. The cooking is done at 125° to 160°, with a pressure of 25 to 125 lb. per square inch (about 2 to 8 atmospheres) until the charge readily defibers upon weak mechanical treatment. The resulting condensate liquor can be drawn off continuously.

Drewsen Patents for Straw Cooking—Cooking methods employing neutral sulphites received special prominence because of proposals to cook the special fibrous materials as straw, sugar cane stalks, etc. The corresponding patents were taken out by Viggo Drewsen, who employs monosulphite, neutral, as well as alkaline. In reality alkali sulphites come into the question which possess the advantage, almost obvious, of considerably higher concentration than possible with lime or magnesia. Drewsen[21] uses 25 per cent sodium sulphite, based on the weight of dry straw. The fiber bundles become sufficiently disintegrated after 4 to 6 hours' cooking at 70 lb. per square inch (5 atmospheres). There is obtained, in a yield of 40 to 45 per cent, based on weight of dry straw, a uniform pulp of gray white color, with a soft feel, but without, however—as is the case with other cooking processes for straw—sliminess, or brittleness, or parchment-like characteristics. Even the knots of the straw stalk are so completely disintegrated that they practically disappear after the cooking, washing and defibering. The medullary rays are so softened that they cannot be distinguished with the naked eye. This product can be used for various purposes (newspaper) without bleaching. Bleached, the product yields very white fibers, suitable for high grade papers. The cooking liquor remains alkaline to litmus throughout the cook. It appears considerably lighter in color than the liquor from alkaline cooking. By acidifying with acetic acid a tannin-like material

[11] Vgl. Schwalbe, D.R.P. 282,050.
[12] Brit. patent 5365 (1882).
[13] D.R.P. 231,078 (1919).
[14] Ber., 31, 3304 (1898).
[15] D.R.P. 325,918.
[16] D.R.P. 283,290.
[17] Cross & Bevan, Cellulose, London, 1910, p. 209.
[18] D.R.P. 151,285 (1902).
[19] Dieckman, Sulfitzellstoff, S. 213.
[20] U. S. Patent, 1,016,178 (1912).
[21] U. S. Patent, 1,229,422 (1917).

is obtained, which may be used as a tanning agent. Sodium sulphite appears to act as a reducing agent, since appreciable amounts of sodium sulphate may be obtained from the evaporated waste liquor.

In a more recent patent Drewsen[32] adds to the treatment of substances with neutral sulphite a second acid treatment. He recommends this method for wheat straw, rice straw, and other straws, as barley, oat, and flax straw. The first treatment is analogous to the above described method. The material is cooked with monosulphite for 4 to 8 hours (for this, magnesium monosulphite may also be used). The material so treated is suspended in water and run countercurrent against gases containing SO_2 until the liquor reacts acid. Thereby various organic substances are supposed to be removed. The fibers become very white and need only a few percent of chloride of lime to bleach. For the recovery of waste liquor Drewsen proposes to evaporate ash, leach, and treat leachings with CO_2; whereupon sodium is obtained as the bicarbonate which, when added to sodium bisulphite, is converted into the neutral sulphite again. This procedure, apparently so simple on paper, should, in practice, meet with considerable difficulties. But about this more later.

Rice straw is disintegrated to very fine, and at the same time, strong fibers that appear to be almost uninjured by this last named process of Drewsen's. The fiber diameter is about 0.006 mm. and is then actually less than that of wheat straw 0.02 mm. The fiber length is the same as that of other straws. The pulp obtained lends itself favorably to the production of high grade paper which, because of its strength, permits of very thin sheets (parchment paper, cigarette paper, etc.) To produce inferior kinds of paper the cooking with the neutral salts is concluded when only part of the incrustations have been removed. Pulp of medium quality is obtained with a yield of 50 to 60 per cent.

The methods described above are indicative of the use of neutral sulphite for straw cooking. Without exception, they are described in patent literature; a judgment as to their technical utility cannot therefore be made. Concerning practical results or experiences on a large scale there are no reports available in the literature at present.

Meanwhile, it ought to be of interest to add here the results of several systematic experiments obtained in recent times by cooking straw with neutral sulphites. These experiments were conducted by M. V. Brot and M. Hirschel[33] and were directed at the cooking of pine wood and straw with neutral sodium, and especially, ammonium sulphites. By the cooking of cereal straw with sodium sulphite liquor of various concentrations it was found that at first the yield of pulp decreased with increasing Na_2SO_3 content in the liquor, reaching a minimum at a 4 per cent solution, after which the yield increased again. This signifies then that a surplus of sodium sulphite—because hydrolysis is suppressed—inhibits any erosive effect of the liquor and hence exercises a kind of protective action on the fiber. The same holds for ammonium sulphite. Comparative cooks with sulphite on one hand and with soda liquor on the other, yield the following results:

On 100 g. dry straw grams Na_2SO_3 or NaOH	Yield with NaOH in %	Yield with Na_2SO_3 in %
10	54.1%	61.0%
20	44.3%	57.5%
30	41.0%	54.0%
40	39.2%	52.5%

A comparison of these values decides throughout in favor of the sodium sulphite cooking.

Cooking Resinous Wood—The experiments made to cook the resinous wood of Bordeaux pine with sodium sulphite liquor are interesting. The wood, in the form of chips, containing 6 to 8 per cent resinous matter, was cooked with 60 per cent sodium sulphite (based on weight of dry wood) at 180° to 185°. After three hours' cooking the chips were poorly opened up; after four hours, as revealed by microscopical examinations, they were well opened up. After 6 hours the fibers showed distinct signs of erosion and possessed, as seen under the microscope, a powdery appearance. The opening up then occurred suddenly between 3 and 4 hours. The pulp from a 4-hour cook had a normal appearance, but was not quite free from rosin.

From these experiments the authors conclude the following advantages for the sodium sulphite method:

1—It yields, compared to the alkali method, 10 per cent more; compared to the chlorination method 15 per cent more.

2—The unbleached pulp is lighter in color than the alkali or the sulphate process product and lighter in weight.

3—Unpleasant odors, as with the sulphate method, do not occur.

4—Iron digesters can be used; the slight corrosion of the metal does not affect the quality of the pulp. The addition of a trace of alkali would inhibit this corrosion.

For the recovery of the fixed alkalies the regeneration method of Schacht is proposed, concerning which more will be said later. The recovery of ammonia follows from distillation of the liquor with lime. For this a surplus of lime and the evaporation of three-fourths of the total volume of the liquor is required. In laboratory experiments the recovery was performed with only 2 per cent losses. It is further proposed to evaporate the residue to dryness and submit it to destructive distillation. Concerning this the authors refer to date according to which[34] per ton of pulp there are obtained 125 kg. calcium sulphite, 250 kg. fertilizer, 16.5 kg. acetone, 15 kg. light and 10 kg. heavy oils.

Experimental Results of Two Methods Compared—Exhaustive studies of sodium sulphite cooking, especially in comparison with alkaline cooking, were made by Rawlings and Staidl on aspen wood. They mention first of all, that on the chips the cooking reagents show a greater ability to dissolve cellulose when a more complete removal of lignin is brought about by them. Since the attack on the pulp in the presence of free acids or free alkalies is of a hydrolytic nature, it would appear that to lessen cellulose losses the cooking should be done with neutral salts. Since organic acids occur when wood is cooked at temperatures above 100°, chemicals that would maintain a neutral state should be employed. Therefore, first to be considered, are the salts of weakly dissociated polybasic acids, which, when used in excess, have the power of keeping the deviation from neutral within desirable limits. Such salts are sodium borate, sodium sulphite, acid sodium phosphate, and sodium oxalate. Because of its relation to the sulphite process on the one hand, and to the alkaline process on the other, the authors chose sodium sulphite, and as a matter of fact, in great surplus over the amount necessary for delignification. Such a surplus prevented extreme retardation of the reaction, and at the same time kept the reaction of the liquor between the limits of the change of color of phenolphthalein (pH 8) and methyl orange (pH 3 to 4).

As raw material the authors used extracted aspen wood with 64 per cent cellulose and 21 per cent lignin. Cellulose and lignin content were determined by the known methods. Maintaining constant the temperature (170°), the cooking time (4 hours), the weight of wood (15 grammes), and the volume of liquor (150 c.c.), with varying content of sulphite in the liquor the accompanying tabulated results were obtained. (See Table I.)

TABLE I

Na_2SO_3 used in % on weight of wood	Yield of pulp in % on weight of wood	Na_2SO_3 consumed in % on weight of wood	Cellulose content in % of pulp	Yield of cellulose on weight of wood in %	Cellulose loss on weight of wood in %	Lignin content on pulp in %
12.8	68.7	9.0	85.9	59.0	5.5	13.0
25.8	68.7	9.0	86.6	60.7	3.8	13.8
51.3	68.5	11.9	87.4	59.9	4.6	13.1
77.6	68.4	12.9	87.4	59.7	4.8	12.0
103.3	67.8	16.0	87.4	59.3	5.2	8.2
128.9	67.6	19.7	87.6	59.2	5.3	7.6

The yields are practically alike, that is, the excess of sulphite causes no losses worthy of mention; the constant loss in all cooks is much more to be ascribed to the temperature.

In another series of experiments the temperature alone was varied, all other factors being held constant. There was used 50 per cent Na_2SO_3 based on the weight of wood. Cooking time 4 hours (the last two cooks were 6 and 8 hours

[32] U. S. Patent, 1,511,664 (1924).
[33] Le Papier, 29, pp. 75-80 (1926).
[34] Papierzeitung, 40 (1915).

respectively). The yields are expressed in the accompanying table (Table II):

TABLE II

Temperature in degrees Centigrade	Yield of pulp in % on wght. of wood	Na_2SO_3 consumed in % on wght. of wood	Cellulose content of pulp in %	Yield of cellulose in % on wght. of wood	Loss of cellulose in % on wght. of wood	Lignin content of pulp in %
120	90.2	0.7	73	66	slight increase	21.6
130	87.1	1.6	76	66.7	in wght. due to	18.1
140	84.2	3.6	78	65	additive com-	16.8
150	80.4	5.5	79.7	64	pounds.	16.6
160	76.7	7.4	80.6	61.9	2.6	15.1
170	68.4	18.9	87.5	59.9	4.6	13.1
180	59.3	18.4	93.1	55.3	9.2	9.1
185	57.3	19.7	94	53.9	10.6	8.1
185 (6 hrs.)	50.2	28.7	96.8	48.6	15.8	6.0
185 (8 hrs.)	48.7	33.7	95.5	46.5	18.0	7.4

As noted in previous figures, the delignification rises rapidly with the temperature but even after a cook at 185°, there are appreciable quantities of lignin left in the fibers. Above 170°, because of hydrolysis which increases with the temperature, great losses of cellulose occur. The removal of the bulk of the lignin necessitates, in any case, temperatures at which the yield has fallen to below 50 per cent.

For comparison the authors conducted a series of NaOH cooks with aspen wood in which NaOH was used in excess (32.5 per cent based on the weight of wood), cooking at 170°. Only the duration of the cooking was varied. The results are given in Table III.

TABLE III

Time in Hours	Yield of pulp in % on wght. of wood	NaOH consumed in % on wght. of wood	Cellulose content of pulp in %	Loss of cellulose on wght. of wood in %	Lignin content of pulp in %
0.5	59	13.8	85	14.1	12.3
1.0	52	16.2	97	13.7	2.7
2.0	49	19.2	99.4	15.4	0.63
3.0	47	21.5	99.6	17.6	0.21

Here then a rapid reaction sets in so that the lignin content even after one hour has decreased to below 3 per cent which took over 8 hours at 185° with sodium sulphite cooking.

In another series of NaOH cooks, the cooking was done with 16 per cent NaOH with all conditions constant except that the temperature was varied. The results for 2-hour cooks are shown in Table IV.

TABLE IV

Temperature	Yield of pulp in % on wght. of wood	NaOH consumed in % on wght. of wood	Cellulose content of pulp in %	Losses in % on wght. of wood	Lignin content of pulp in %
180	57	16	93	10.8	9.0
170	58	14	91	10.7	8.7
160	63	13	86	9.6	13.2
150	68	12	82	8.3	17.5
140	71	11	78	8.3	21.0

Viewing the comparison of these two cooking methods, from these experimental results, the following is noteworthy. If less than 17 per cent of the lignin be removed, then the loss of cellulose with soda liquor is much greater than with sodium sulphite. With greater delignification, however, this relation becomes reversed. Alkali removes, at 140°, other substances besides lignin. With sodium sulphite, contrarily, these actions first begin at 170°. Sodium sulphite is appropriately used for cooking at 140°. In this way, comparatively high yields are obtained; the residual lignin can be removed by chlorination. The white color of the sodium sulphite pulp indicates that this reagent does not permit the precipitation or deposition of brown substances on the fibers (as is the case with alkaline cooking).

The results obtained permit a good survey of the action of neutral sulphite on wood. It must be taken into account, however, that the results were obtained with wood previously extracted with alcohol, and for this reason conclusion concerning the practicability of this process must be drawn with caution. In practice one certainly ought not to come around to a more or less decidedly acid or alkaline procedure. In the former case, for economic reasons, lime is the base used, but in the latter case, if the character of a sulphite cook is to be maintained at all, only alkali sulphite with addition of alkali or other salts of alkaline reaction with other acids than SO_2 can be employed. There are a large number of patents proposing such methods.

Schacht's Development of Alkaline Sulphite Process—The oldest proposal of this kind comes from Thomas Henry Cobley,[25] who used for cooking a caustic liquor (soda liquor, crude potash, or wood ash) together with a saturated solution of sodium or potassium sulphite (even sulphate). But the actual development of the alkaline sulphite process was first made by Schacht,[26] who proposed a liquor for the cooking of straw, esparto, wood, etc., which really consisted of sodium sulphite, and which contained only so much NaOH as was absolutely essential for the cooking out of the silicates and aluminates of the vegetable matter concerned. He passed sulphurous acid into the liquor obtained from the leachings of the fusion from soda recovery until all the NaOH, Na_2S, and part of the carbonate had been converted into sodium sulphite with a slight amount of sodium thiosulphate. The rest of the carbonate from the raw leachings was causticized with lime. With such a liquor the cellulose losses are supposed to be nil, with a 10 to 15 per cent higher yield than with the soda or sulphate method. The pulp produced is stronger, lighter in color, and easy bleaching, has a negligible pentosan content, and is not, like soda pulp, readily fermented or spoiled by parasitic fungi. The properties of this pulp resemble, very nearly, those of the acid sulphite cooked pulp. The practical application of this process registered no results, and this for reasons which will be gone into with more detail further on.

The ammonium sulphite method of Braun met with a change to the alkaline side in the method of Rosenblum, Brech and Tyborowski.[27] The patentees protected the use of ammonium sulphite in the presence of an excess of ammonia. According to their statement, neutral sulphite yields dark colored to brown pulps for the reason that during the cooking process the SO_2 set free by the plant acids attack the fibers very strongly at the high cooking temperature. To prevent this harmful action the patent holders add enough ammonia to the ammonium sulphite liquor on chips so that 1 per cent free ammonia is available. The cooking time is about 10 hours. In this way there is obtained a yield of 65 per cent of bleachable pulp from dry pine wood. The presence of free ammonia, whose quantity depends upon the rosin content of the wood to be cooked, causes a comparatively high pressure (10 to 12 atmosphere at 165°) and permits the cooking to be carried out at lower temperatures.

The "Keebra Process"—Recently a great sensation was caused by the so-called "Keebra Process" of Bradley and McKeefe,[28] which is very similar to the process of Schacht. The cooking with neutral alkali sulphite forms the foundation of this process. In accordance with the previously described findings of Brot and Hirschel, the patentees found that the fibers were substantially unscathed even when a considerable excess of the cooking reagent was employed. They further established that with sodium sulphite cooking much less alkali (combined) is required than when the cooking is done with caustic soda alone. In many cases they add free alkali to the liquor, but this addition is not absolutely necessary; it depends much more upon the nature of the raw material used. For this, woods are divided into three groups, classed as follows:

A—Woods with only little or no resinous constituents, such as poplar, birch, aspen, cotton wood, Canadian bass wood, etc.

B—Woods with moderate rosin content as spruce, fir, hemlock, balsam and the like.

C—Woods with high rosin content as Georgia pine, jack pine, longleaf pine, etc.

For cooking of the woods named in (A), no addition of alkali is necessary. Cooking is done with sodium sulphite alone, and

[25] D. R. P. 21,268 (1882).
[26] D. R. P. 122,171 (1900); D. R. P. 131,118.
[27] D. R. P. 257,544 (1911) and D. R. P. 252,321.
[28] D. R. P. 375,053 (1923); Brit. pat. 105,434, (Can. pat. 219,557, June, 1921).

the sulphite is so apportioned that the liquor will not turn acid. When cooking wood with water or when cooking with small amounts of sulphite, the liquor turns acid. Should, however, more sulphite be added, the acid reaction ceases. "The sodium sulphite appears to combine with the constituents which otherwise would give an acid reaction." Although, for example, old poplar treated with a liquor containing 20 per cent sodium sulphite (based on the weight of wood containing 10 per cent moisture) still became acid, the acid reaction disappeared with 25 to 30 per cent of normal sodium sulphite. For most woods 30 per cent Na_2SO_3 was the least, in some cases up to 45 per cent was used; but 50 per cent and over may be used without injuring the fibers, though there appeared to be no special advantage in using such an excess in the process. For the cooking of the wood under (B), sodium sulphite liquor does not suffice because various resinous constituents are retained. The addition, then, of small quantities of alkali (soda liquor) commends itself and, indeed, only towards the end of the cook. Should alkali be added to begin with, darker pulps and darker liquors result. The woods mentioned under (C) are cooked in two stages. In the first stage the cooking is done with a liquor containing 35 to 40 per cent (based on the weight of wood) of sodium sulphite, and at a pressure of 120 lb. per square inch (8.5 atmospheres) for 4 hours. The liquor is then drawn off and the cooking of the second stage done with a liquor containing 20 to 25 per cent Na_2SO_3 (on weight of wood) with the addition of 1 to 3 per cent NaOH (on weight of wood) for the same length of time and at the same pressure.

The advantages of the Keebra process are supposed to consist of the following points:

1—In contrast to previous methods, yielding 38 to 45 per cent on the average, this method gives substantially higher yields of pulp. Thus the yields were with old poplar 61 per cent, with young poplar 67 per cent, with hemlock 50 per cent.

2—With the aid of this method a series of woods may be drawn upon which heretofore could not be successfully cooked with sulphite process. This holds especially for woods rich in rosin. Also a mixture of woods of similar characteristics can be treated by this method. The knots of sap bearing trees, which present abundant difficulties in the usual sulphite process, become, substantially, as completely delignified as the other parts of the wood, so that a uniform pulp results.

3—The waste liquors obtained differ fundamentally from those occurring in other processes. They are almost completely free from decomposition products of the pulp and may, upon replacement of the original sulphite content, be used over again five times for cooking. The concentration can be raised to 200 grams per liter. The same holds for the liquors for the two-stage process. For the recovery of the base there are then lesser amounts of water to be evaporated than is the case with the use of weaker liquors.

4—Because of the substantially unscathed fibers, long fibered pulps are obtained; even the short fibered poplar wood yields a pulp which is, on the whole, very similar to a long fibered one. The quality of the pulps is appreciably improved. Also the pulps are easier to bleach; this holds even for pulps made from southern pine.

5—As further advantages it is asserted that no annoyances due to odors occur and that the digesters require no lining.

Doubtless there is much to be said for the general utility of the process, especially since attention is drawn to certain kinds of wood hitherto unapproachable by means of the sulphite process. The possibility of reusing one and the same cooking liquor several times proclaims a step forward toward the fuller utilization of the expensive alkalies. Whether or in what circumstances the manifold reuse of the liquor affects the quality of the pulp produced, is a question at present unanswerable. However, one cannot avoid a recovery for alkali.

Concerning the difficulties which such a regeneration entails, Schacht reports in 1923.[29] He had already laid down the fundamental idea of the Keebra process in 1901, in the patent literature mentioned above. He had established at that time that sodium sulphite dissolved the incrustations exceptionally well under high pressure and that there was a very light colored, strong pulp obtained with a good yield, the fibers being quite undamaged. However, the recovery of the alkali salts presented difficulties so pronounced that because of them the application of this method on a large scale was made impossible. Schacht writes concerning this:

"In evaporating, the sulphuric acid salts wrought such havoc with the evaporators that in a short time their capacity became very much reduced. The higher the temperature of the evaporator, the greater this trouble. Also, during the evaporation sulphides were formed which corroded the condensation and air pump systems very much. These sulphur compounds formed the recovered fused salts and varied very much in quality and action. Because of this, upon reproduction of fresh liquor, a number of salts were obtained that were not conducive to the cooking of vegetable matter to pulp.

"For this reason the regeneration of salts from waste liquors offset the advantages of the monosulphite process, and these defects increase in the course of prolonged manufacture, since the liquor and the salts recur in uninterrupted cycles."

Schacht here appends the suggestion that those mills which work according to the De Vains process might perhaps use to advantage a sodium sulphite cooking in place of the soda liquor cooking in the first stage, since in these plants the salts are not recovered from the liquor anyway. The present cooking with caustic soda yields slimy pulps; but it is very probable that with less slimy pulps, chlorination occurs more completely. For this reason the bleaching action in the precooking with sodium sulphite is more significant.

The difficulties of alkali regeneration expressed by Schacht hold for all sulphite processes in so far as fixed alkalies predominate as the base. It is this that hinders the utilization on a large scale of a process which otherwise appears so advantageous. Without alkali recovery, however, all these processes are at once condemned as uneconomical. The alkali recovery methods practiced in the sulphate and soda processes do not permit of application to the waste liquors from sulphite cooking, which contain considerable quantities of sulphate, sulphide and thiosulphate. Here lies the cardinal point of the sulphite process with alkali as base. It is no wonder then that the native and foreign patent literature contains a large number of propositions which aim at a cheap recovery, at a more thorough utilization of fresh liquors, or at an economic application or at a regeneration of waste liquors.

Thus, a Canadian patent[30] suggests the addition of an ammonium salt to the waste liquor, whose acid would form a salt causticizable with lime. Another Canadian patent[31] would spray the waste liquors into a hot atmosphere of SO_2 and CO_2 vapors. Still another Canadian patent[32] regenerates the waste liquor by means of SO_2 or bisulphite. For the preparation of fresh liquor a Canadian patent [33] proposes the treatment of sodium sulphate or bisulphite with SO_2 in the presence of lime. By the treatment of the waste liquors with sodium bisulphite a Canadian patent[34] would accomplish the precipitation of organic matter. Harnist[35] proposes cooking with potassium or ammonium sulphite with special regard for the utilization of waste liquor. After the precipitation of the tannin-like matter by heating and perhaps a previous fermentation, the liquor should find use as a fertilizer because of its potassium and nitrogen content. Richter[36] combines the sulphite and sulphate methods. The fusion of the liquors is done in two ovens, partly reducing (Na_2S and Na_2CO_3) and partly oxidizing (Na_2SO_4 and Na_2CO_3). The smelts from the first oven are, if necessary, after causticizing used as the alkaline liquor for the sulphate process, while the smelts from the second give, after acidifying, a liquor for the acid cooking. (The process is, in general, very complicated.)

None of the many propositions made in regard to the problem, from which the above mentioned are only a selection, has, up to the present, relieved the difficulties and made possible the introduction of sodium sulphite cooking on a large scale.

An alkaline cooking process, in which only small amounts of alkali sulphite are added, was worked out by Dimitry Chou-

[29] Wochenblatt fuer Papierfabrikation, 54, 8. 2851 (1923).

[30] Can. patent 236,528.
[31] Can. pat. 236,531.
[32] Can. pat. 236,532.
[33] Can. pat. 246,302.
[34] Can. pat. 236,530.
[35] Brit. pat. 156,777.
[36] U. S. Patent 1,519,508 (1924).

chek[37] and, as a matter of fact, for the special purpose of cooking esparto. Alkali sulphite or bisulphite added in quantities of from 2 to 0.01 per cent to the cooking liquor are supposed to have an accelerating influence on the reaction. This addition can succeed with normal cooking liquors for esparto, but this process appears more economical when a special procedure is adopted, which may be distinguished by the following points: After the cleaning and cutting up of the raw material it is soaked in the cold, first in acids and then in alkalies. These solutions are very dilute and contain catalysers (sodium sulphite) and protective substances (aniline) in the proportions given. By this treatment the bulk of the incrusted material of the esparto fibers is removed. After draining, the material is put into a solution of 2.5 to 3 per cent NaOH to which the same substances have been added. Of the alkali 5 to 7 per cent by weight is taken up by the material. Sulphite, contrarily, is hardly taken up at all, so that the solution, after adding alkali up to the original amount, can be used over again several times. The soaked material is heated in an autoclave at 140° for 20 to 30 minutes; with direct cooking care must be taken, however, that the solution soaked into the fibers is not diluted too much by condensate. Water (as steam) to the amount of six times the weight of the plant material should suffice for heating. In this way only 6 to 7 per cent of alkali instead of 12 to 15 per cent is required for cooking. Under normal pressure the cooking can be finished in two hours. A very light colored fiber should result which requires much less chlorine to bleach than that obtained by other methods.

Other Acids in Cooking Liquor—There are now only one series of methods described—those in which, besides sulphurous acid, other stronger acids, bound to alkali occur in the cooking liquor. As a matter of fact, Schacht's liquor contained besides sulphite small amounts of thiosulphate. This last is supposed to have a favorable effect on the cooking action. According to one Canadian patent,[38] one can even cook with thiosulphate in alkaline solution.

Müller and Heigis[39] propose liquors for the cooking of highly incrusted plants as jute, manila, reeds, esparto, etc., which are different from Schacht's liquors only in that they are weakly alkaline and that they contain besides sodium sulphite also sodium acetate. With the help of this liquor extensive delignification without noticeable injury to the fibers is enabled. In particular, in this way white, shive-free pulps are obtained. The disposal of the liquor is accomplished by acidifying with sulphuric acid or bisulphite and distilling off a mixture of sulphurous and acetic acids which are led into the leachings from the alkali smelter, and thus the original liquor is regenerated.

C. A. Braun[40] suggests a liquor for the cooking of cellulosic raw materials containing besides sodium sulphite also sodium sulphide and some weakly combined alkalies. In this way the alkalinity of the liquor is decreased to a definite minimal value. Straw, typha and reeds yield, after a six-hour cook with 25 kg. Na_2SO_3 and 7 kg. Na_2S (made up to 700 liters for 100 kg. chopped straw) pulps which can be bleached to a highly white color with 14 per cent chloride of lime. The sulphurous acid is cooked down to 0.2 per cent in this method. For jute and nettle stalks a liquor is prescribed which contains 15 kg. of soap or soda, 10 kg. Na_2SO_3, and 5 kg. Na_2S in 700 liters (for 100 kg. of raw material). It is cooked for four hours at 135°. The jute pulp can be bleached with 20 per cent chloride of lime. The fibers from the nettle stalks show a high degree of whiteness and a strength that surpasses considerably that of linen fiber. Some raw plants like nettle and linen are green when they come from the digester; this is attributed to the formation of reduction products of chlorophyll. In such cases Braun[41] adds caustic alkalies, by means of which the reduced dyestuffs are removed. The soaking procedure may also be carried out advantageously with the liquors described;[42] replenishing with alkali may be decreased thereby. Aided by vacuum, the raw material is saturated with a liquor either under pressure or by soaking a number of hours. This liquor contained in 200 liters (for 100 kg. raw material) 25 lg. Na_2SO_3 and 6.5 kg. Na_2S. The liquor is then drained and the material steamed. The material, which has taken up about twice its own weight (when well dried) of liquor, is cooked for 2 to 3 hours. In this way a shive-free, light colored pulp is obtained.

In more recent times C. A. Braun has proposed other liquors for the cooking of grasses and slightly incrusted plants like straw, reeds, bamboo, and material containing chaff, as manila hemp, jute, and flax and hemp tow. These liquors combine favorable cooking action with the advantage of greater economy, since the cooking agents are used in comparatively small amounts when based on the raw material. The actual components of the liquor are sodium sulphite, sodium silicate and caustic soda. The last is necessary, however, in only a few cases. For 100 kg. of reeds 200 liters of a liquor with 4.5 per cent Na_2SO_3 3.5 per cent sodium silicate and 0.5 per cent caustic soda is prescribed. The cooking is done at 165° for 4 or 5 hours and gives, with a high yield, pulp of light color, easy bleaching, and with good characteristics. The silicic acid does not, as one might expect, precipitate because of the plant acids developed during the cook, but instead the cooking liquor remains clear and at most takes on a faint opalescence. Up to the end of the cook there is a surplus of combined SO_2, which must be present if the digester contents are not to become brown.

It must be assumed that even the silicic acid takes part in some way in the cooking action. Contrary to experiences with straw waste liquors rich in silicic acid, the regeneration of these liquors offers no difficulties.

The above described liquors are not suitable, however, for the production of half-stuffs. Since to maintain a profit in the production of half-stuffs only small amounts of SO_2 are employed, this sulphurous acid is either completely used up and a strong brown discoloration comes up which cannot be gotten rid of with chlorine in economically reasonable amounts, or else the sulphurous acid is cooked down only to a certain degree, in which case the cook is raw, and a raw pulp, full of shives, results. The consumption of SO_2 is, however, very rapid and is complete before a sufficient degree of cooking action is attained. We get a completely different picture, however, if alkali sulphite is used together with salts of weak acids which do not set free sulphurous acid and which do not attack the digester. As such a salt G. A. Braun[43] suggests sodium bicarbonate. Weak solutions of sodium sulphite and sodium bicarbonate give well cooked half-stuffs at 160°. The sulphurous acid is by this method cooked down to a few hundredths of a per cent.

Concerning practical results with the above mentioned methods, nothing further as yet has become known. In principle it appears certain that the cooking of grasses and similar raw materials is impossible with acid cooking methods, and possibly only with poor yields and mediocre quality in the alkaline processes. Further, that by means of an alkaline sulphite cooking with the addition of alkaline substances it would be possible to produce pulps of technically satisfactory quality and yields. However, here again occur the difficulties of alkali regeneration that hinder the large scale technical application of these processes.

Methods With Mixed Base Liquors

We turn now to these methods in which mixed bases occur in the liquor, i. e., greater or lesser amounts of alkali salts are added (in reality sodium salts) to the ordinary lime or magnesia bisulphite liquors. In all such cases, if practically no alkali in the form of bisulphite has been previously added, a formation of such a bisulphite occurs, due to an equilibrium reaction between calcium bisulphite and the soda salt. Alkali bisulphite appears, however, to have a decided influence on the cooking yield. This observation is noted in all of the patent references that follow, regardless of whether the alkali predominates as base or whether it is added only in small amounts to the calcium bisulphite liquor. One must assume, obviously, a specific action, which may perhaps be due to the sodium ion and be of a catalytic nature; perhaps there is also colloidal chemical behavior involved, possibly also purely physical considerations. The views concerning this are, at present, still widely divergent, and it would be a worthy task,

[37] French Patent 515,501 (1921).
[38] Can. Patent 246,477.
[39] D.R.P. 309,181 (1916).
[40] D.R.P. 309,181 (1916).
[41] D.R.P. 309,236 (1918).
[42] D.P.R. 400,859 (1923).
[43] D.P.R. 397,927 (1923).

while no easy one, for scientific research to clarify this situation. At present it can only be asserted that the action of sodium through its salts does affect the action, and that further, the Serlachius process, below described, employing this idea, has been successfully applied technically on a large scale.

Of the many methods of procedure employing this addition of sodium salts to sulphite liquor, the next to be mentioned is that of Drewsen and Dorenfeldt,[44] protected in an Austrian patent. It consists of adding sodium sulphate to the sulphite liquor, whereupon insoluble gypsum and sodium bisulphite result. About two-thirds of the lime is so precipitated. The cooking with such lime-soda-bisulphite liquors yields desirable pulps which can be bleached with 5 per cent chloride of lime and which may be overcooked without any harm. For recovery, the liquor is neutralized with caustic lime and calcined. In this way the sodium sulphate that had been added is recovered as sodium carbonate. Just how this method, which excited much controversy at the time,[45] was utilized in practice cannot be determined. The same holds for the Croker process which according to Griffin and Little[46] used a liquor made up of lime bisulphite, sodium sulphate, and sulphurous acid.

Drewsen[47] in order to inhibit staining during the cook, proposed to permeate the material with a suitable liquor. As such a liquor neutral alkali sulphite was recommended. (Na_2SO_3 or weakly acid $MgSO_3$) containing, for example, 4 parts $Na_2SO_3.7H_2O$ in 100 parts of water. After the soaking the regular cooking process with lime bisulphite was started. Actually then Drewsen cooked with a soda-containing lime liquor. There are only small amounts of soda contained in the liquor. The same holds true for the Bache-Wiig[48] process, according to which a small amount of sodium chloride (0.5 to 3 per cent is added to the ordinary sulphite liquor. This forms, by double displacement, sodium sulphite or bisulphite, which has a better action on the fibers than lime bisulphite. The resulting chlorides of lime and magnesia have, in the opinion of the patentee, a definite bleaching action and accelerate the penetration of the liquor into the raw material. The addition of salt, prevents, or at least inhibits the formation of hydrocellulose, so that the yield increases 4 to 6 per cent. Experiments have shown that one can get along with lower cooking temperatures. The patentee ascribes the advantages observed chiefly to the physical penetration of the sodium chloride, since in chloride-free bisulphite liquor these advantages do not occur so markedly.

The addition of alkali sulphite to ordinary cooking liquors is of exceptional interest in connection with the cooking of woods which have difficult, soluble incrusted matter and a high content of coloring matter as, for instance, red beech. In such cases the alkaline process gives poor yields and a dark colored pulp which takes a great deal of chlorine to bleach. With acid methods there are even greater difficulties; the pulp readily takes on a gray blue color, due to absorption of acid, which cannot be removed with water, and which turns red brown to brown yellow with chloride of lime. Further, lime sulphite precipitates onto the fibers; also, the reduction of the coloring matter in the interior of the wood is most incomplete, so that yellowed fiber bundles remain. The much stronger decolorization brought about by alkali sulphite is used by C. A. Braun[49] for the cooking of these woods, the liquor containing lime bisulphite and sodium bisulphite. For economic reasons, technically the sodium sulphite was replaced by magnesium sulphite which has a nearly similar action.

In the cooking of resinous woods the addition of alkali plays an entirely different role. In such cases, as for instance, with pine, ordinary cooking methods with lime bisulphite liquors are without results because the liquor is unable to remove both lignin and rosin in sufficient quantities. It was then found out that even magnesium bisulphite brought about an improvement, inasmuch as the rosin content of pulps so cooked was only two-thirds that of pulps cooked with calcium bisulphite.[50] The action of alkali bisulphite is even better. Experiments by McKee and Cable[51] revealed that for these pulps a special rosin emulsifying agent is required. For instance, the experimenters, using the heartwood of pine, which could not be cooked with calcium bisulphite, readily cooked the same with sodium or ammonium bisulphite. Even small amounts of alkali sulphite, when added to the ordinary cooking liquor, showed this effect. The use of such a liquor is the central idea of the Alfthan-Serlachius process.[52] The fundamentals of this process, which, in the last few years, achieved technical application in Finland and France, are as follows:

The Alfthan-Serlachius Process—Solutions of soda or soda liquor (or sodium sulphate) are put into the digester only in such amount that there is at most 1 per cent Na_2CO_3 calculated on the weight of the cellulose in the wood. To this is added a lime bisulphite liquor with 3.5 to 4.5 per cent total SO_2 and 0.8 to 1.5 per cent combined SO_2. The cooking is done at somewhat higher pressures and lower temperatures than in the sulphite process. The most favorable conditions are 5 to 6 atmospheres and 130° to 150°. Experience has demonstrated that the described liquors are able to cook, under the given conditions, not only pine wood, but also Finnish fir, the pulp of which is fully equal in quality to that of spruce and white fir. This information was confirmed by analyses, conducted by Sjeber[53] in the Central Laboratory at Abo, in which the rosin content of spruce pulp is compared with that of the Serlachius cooked pine pulp.

	Spruce pulp	Pine pulp
Alcohol extract	1.85%	1.65%
Ether extract	1.41%	1.32%

Sieber considers this result to be quite remarkable since calculation shows that 60 to 70 per cent of the wood resins were removed during the cook. As regards the question of how the action of the alkali bisulphite is to be explained, he refers to the views of Schwalbe according to which alkali bisulphite containing acid liquors possesses the unique property of swelling the otherwise impenetrable resinous pine wood in some way which enables the liquor to penetrate. Since, because of the small quantities of alkali bisulphite present, no important chemical reaction involving it could take place, one must assume that colloidal chemical actions play a part.

The Serlachius method, first applied in Finland, was recently (1924) taken up in southern France. Southern France possesses extensive forests, the principal tree being a conifer Pinus maritimus. This pine has a comparatively high rosin content and is for this reason used for producing turpentine. At Montech (Tarn et Garonne) a sulphite mill was built after the war which was to get its wood from the north. While still under construction, such a rise in freight rates occurred that profits became questionable since the pulp prices had not risen correspondingly. Under those circumstances it was decided to utilize the wood from the neighboring forest and to cook with the Serlachius process.

The results of several large scale experimental cooks are given below:

Cook 1—Wood partly rotten and blue; about 40 to 60 years old. Average moisture 23 per cent; rosin 3.2 per cent.

Cook 2—Fresh wood of rapid growth, 20 to 40 years old. Average moisture 20 per cent; rosin 5 per cent.

Cook 3—Same as 2. Moisture 18 per cent; rosin 4.5 per cent.

The average of the results of these three cooks gave the following figures:

Total wood (dry weight)	22,200 kg.
Time of cooking	14.8 hours
Pulp with knots (dry weight)	9,274 kg.
Clear sulphite pulp	7,922 kg.
Pulp on weight of wood	35.7%
Knots	6.1%
Total pulp on weight of wood	41.8%

Various kinds of paper were made from this pulp. One paper containing half sulphite and half waste papers (50 per cent groundwood) had a weight of 92 grams per square meter, or according to another size, 25x38—52.17/500). Also, greaseproof paper could be made from 100 per cent sulphite, giving

[44] Papierzeitung, 1894, S. 2715.
[45] Vgl. Papierzeitung, 1894, S. 2877.
[46] Chemistry of Papermaking, New York, 1894, p. 230.
[47] U. S. pat. 730,439 (1903).
[48] U. S. pat. 1,240,920 (1917).
[49] D. R. P. 279,517.
[50] Schwalbe, Papierfabrikant, 925, Festheft S. 99.
[51] Paper Trade Journal, 1925, T. S. 41.
[52] U. S. pat. 1,507,559; D. R. P.-Anm. S. 63,991 (1925).
[53] Ueber das Harz der Nadelhölzer und die Entharzung von Zellstoffen, Berlin, 1925.

a weight of 48 grams per square meter (or according to another size (24x36—28.33/480). Tested by the Schopper method it gave a breaking length of 3.800 meters. In all cases the pulp was easy to work with; no rosin troubles were encountered.

The Serlachius process created great speculation in America and Canada where the possibility of utilizing wood not heretofore used, like southern pine and others, aroused lively interest. The inventor, the Finnish engineer Serlachius, awaits the time for the introduction of this process in America.

A Review

With this we come to the end of our journey through patent literature and other publications concerning sulphite cooking with alkalies as bases. Reviewing, in closing, the path traversed, and examining the economic possibilities, we see that the prospect for the technical application of acid methods with alkali as base for ordinary woods is not so slight as it would seem in view of the compulsory alkali regeneration situation. The strong cooking action of the liquor combined with the higher bleachability, giving higher quality of pulp, have led, in some circles, to an earnest consideration of the introduction of the large scale technical process. This is especially true of such mills as produce both sulphite and sulphate pulps and would thus be able to run the waste liquors through the waste sulphate liquor recovery plant. Further future possibilities of the alkali or ammonium sulphite and ammonium bisulphite methods depend upon their application to those raw materials which connot be cooked, either insufficiently or not at all, with other methods. In this respect the methods of Serlachius and of Drewsen and of Braun take on a certain significance. The first has the advantage of being independent of alkali recovery. Its field of usefulness lies in the cooking of highly resinous woods, which, some day, will become prevalent, in view of the growing demand for pulp. No less important, however, are the possibilities indicated by the latter methods for converting into valuable pulp the grasses, straws, and similar raw materials which are available annually in great abundance. These methods are dependent upon a suitable recovery process for alkali; unless the quality of the pulps so produced will be so high that the consumption of alkali will not be of economic importance—and of this there is yet no sign. Should one succeed in finding some way of technical utility, then, without a doubt, these methods would become highly important technically. Perhaps then, an old dream of the pulp chemist would materialize, one that would have a combination of chlorine-alkali electrolysis with the sulphite process, which MacNaughton sketches about as follows:

From ordinary salt, chlorine and alkali are obtained.

Chlorine with lime yields the bleaching agent.

Alkali with SO_2 gives sodium sulphite or sodium bisulphite as the cooking agent of the liquor.

The recovery method for the liquor would be the removal of organic matter (from which by-products could be obtained) and replacement of the original sulphite content. Only the lime is lost; its recovery is deemed unprofitable. This cycle would be even more complete if the recently developed processes for electric regeneration of liquors would lead to satisfactory results. It would then be possible to recover, besides heat and organic matter, sulphurous acid and caustic soda.

The review as given shows, at any rate, the interest and activity with which radical modifications of the sulphite process are adopted, especially in those foreign countries in which, sooner or later, a lack of suitable raw material threatens. It is to be expected that in the near future more will be heard in the American trade literature concerning the practical results obtained with large scale sodium sulphite cooking, and then a clearer and more complete picture of the value of these methods can be made than can be drawn from patent literature alone.

The 1927 Get-together Conference of Pine Products Producers will be held February 21-23 at the Carling Hotel, Jacksonville, Fla., according to official announcement by General Chairman Carl F. Speh. Invitations will be extended to all naval stores men, owners of pine lands, consumers of pine products, and people interested in the forestry of the South.

Forestry Associations Meet

Program of Valuable Contributions on Forestry and Its Relation to the Public and Industry

NEW HAVEN, Conn., was the center of activity on January 28-29 for conservationists from all parts of the country, who came to attend the joint annual meeting of the American Forestry Association and the Connecticut Forestry Association. Governor Trumbull welcomed the assembled foresters.

Forestry and the Public—Papers and discussions for the morning of the first day were centered around "Forestry and the Public," rather than technical questions relating to conservation, including state and national forestry, game protection, forest fire, forest utilization, chemical developments in the use of wood and outdoor recreation. President Pratt addressed the large gathering on "American Forestry Today" and urged an adoption of "an all inclusive conservation policy," and the co-ordination of bureaus "into a separate department to be known as the department of conservation, or one equally well named."

He stated that the natural resources owned by the people are far too valuable and too important to the permanent development of our country to permit any part of them to be dissipated by the traditions of departmental administration. He praised the Connecticut idea of harmonizing state activities in forest, park and wild life conservation within the state, as an admirable attempt to give proper weight and support to each one of these important needs under a plan looking to highest economy. He said that the failure of the Federal Government to measure up to the obligations which it assumed under the Clarke-McNary Act of 1924 has challenged the success of the whole undertaking. The Government in its failure to finance its share of responsibility to assure adequate fire protection for forest lands, providing only $710,000, had violated its obligation under the act which amounted to $1,250,000, inasmuch as the state and private agencies had raised $4,000,000 for the purpose. The budget provision was increased to $1,000,000 after the facts had been presented to President Coolidge. He stated further that the American Forestry Association believed that $1,500,000 should be appropriated by the Federal Government for forest fire prevention.

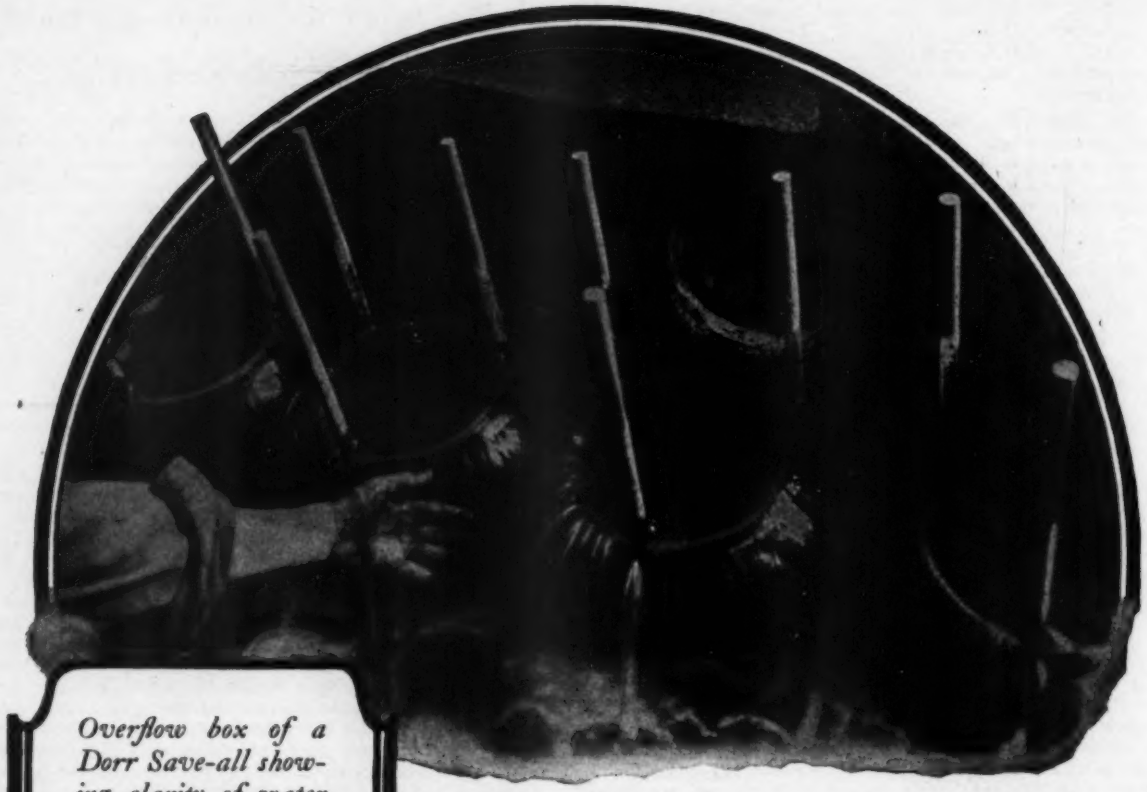
Political expediency, rather than careful determination of whether or not the area conformed to "those scenic and scientific standards which distinguish our present national parks" was the dominating factor in the selection of at least one of the three national parks in the southern Appalachians authorized by Congress, provided the area should be donated to the Government, he said.

He stated that this precedent opens a challenge as to whether our national park system shall remain one of restricted areas, comprising only the highest and most inspiring type of woodland area, or through political bartering and regional rivalry shall become an extensive chain of commonplace areas imposed upon the Federal Government for administration as public playgrounds.

Forestry and Industry—The topic of the afternoon's discussions of the first day was "Forestry and Industry," and papers were given on "Where Will the Lumberman Get His Future Supplies?," "Chemical Trends and Possibilities in Wood Utilization," "Forestry and the Railroads," and "Making Wood Last Longer." Inspection trips were made by the members and their guests, including visits to the building and collections of the Yale School of Forestry, the Peabody Museum of Natural History, and the New Haven Progress Exhibit.

New England Forestry—The joint session with the Connecticut forest fire wardens was held January 29th, and the discussion was "New England Forestry." Albert M. Turner, field secretary of the Connecticut State Park and Forest Commission, gave a paper on "Some Neglected Values in New England." John S. Lawrence, president of the New England Council, told the gathering that in order for New England's forestry program to be effective, it must be adapted to the purposes of economic gain on the part of those controlling the forest lands.

Conservation must be optimistic and aggressive work instead of passive and pessimistic, according to Mr. Sherman of the United States Forest Service. The prevalent attitude of



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INVESTIGATION TESTS DESIGN EQUIPMENT

looking upon the diminishing timber resources of the country as alarming, is all wrong. He urged that emphasis be placed on the improvements that can come in our homes, streams, fishing, hunting and landscape through a small expenditure of money, which will result in our demonstrating that as a nation we are self-supporting and permanent, and not that we owe our commercial supremacy to an accidentally fortunate heritage of rich resources.

Forrest L. Colby, former forest commissioner of Maine, talked on "The New England Pulp Industry and Its Dependence upon the Forest," and Dr. Charles F. Marvin, chief of the United States Weather Bureau, read a paper "The Weather Man as a Forest Fire Fighter."

Forests and Wild Life—The Connecticut Botanical Society at its joint session with the American and Connecticut forestry associations in the afternoon discussed "Forests and Wild Life," Albert F. Hill, instructor in botany at Yale University spoke on "A Rational Wild Life Plant Conservation Program; Dr. Charles C. Adams, director of the New York State Museum, talked on "Preserving Wilderness Conditions," and the closing speaker, Will C. Barnes, assistant forester of the United States Forest Service, gave a talk on "The Romance of the Grass Lands."

Prof. R. C. Hawley of the Yale School of Forestry was in charge of a field excursion on the following day, January 30th, to the forestry operations of the New Haven Water Co., at Matby Park. There were many that remained over for this trip.

Meeting of Paperboard Industries Association

Members of the Paperboard Industries Association met at the Palmer House, Chicago, January 19th and 20th in Group Sessions, jointly and in groups.

Folding Box Group

The Folding Box Group met with Vice-President H. S. Hinkle presiding, who summarized the sales promotional activities of the association, particularly on ways and means for promoting the use of folding boxes. Grafton Whiting, statistician, reported upon the statistical charts and summaries showing operations in the folding box industry. The charts and summaries discussed at the meeting covered the following items: days to run; operation of cutting and creasing presses; activity of the printing divisions; plant activity as a whole, and seasonal variation. The Folding Box Group is also making a detailed study of depreciation, and information is being collected to show practices obtaining in the industry. It is expected that when sufficient data has been gathered, a standard basis of rates may be presented to the Internal Revenue Department, looking to its adoption as the proper basis for depreciation on machinery, etc., used by the folding box industry.

Members also discussed the uniform cost system which is in operation in some of the plants. Vice-President Hinkle made some interesting remarks on "Waste in Industry—Other than Manufacturing," and other subjects discussed at the meeting were: trade customs; the outlook for 1927; and the collection service for folding box manufacturers, through the medium of the association.

Paperboard Group Meeting

Members of this group met with Vice-Pres. W. J. Alford, Jr., presiding, who gave an interesting opening welcome to the members, stressing the importance of co-operation and constructive criticism in the coming year. He presented some interesting figures showing operations during 1924, 1925, and 1926.

Mr. Grafton Whiting, statistician, reported that a questionnaire had been sent to all the mills, to secure information showing the rate of depreciation on the different machines in the paperboard mills, for a basis of compiling depreciation rates justified by present practice in the industry.

The Paperboard Group went on record as being in favor of co-operating fully with the Container Group for elimination in manufacture and use of inferior container board. The Paperboard Group realizes that it can assist materially by doing its utmost to see that any linerboard sold for use in corrugated boxes is of such quality as meets the specifications of the railroads and express companies for so-called test boxes.

Container Group Meeting

The Container Group met with John L. Barchard, a member of the executive committee presiding, in the absence of Vice-Pres. Irving Hill. He stressed the necessity for improving the quality of corrugated and solid fiber shipping containers. He emphasized that regardless of price, the quality must be maintained. He expressed the thought that the tendency to build a product to suit the price obtainable must be abolished for the good of the Association. He referred to the code of ethics, or good business practice, as a subject in which everyone should be vitally interested.

F. A. Norris, a member of the Committee on Trade Customs, submitted a report, followed by a group discussion of eliminating the manufacture of inferior boxes. Statistics are being collected to show the amount of low-test board which is purchased, and an effort made to ascertain just how much of this product is improperly used in the manufacture of test boxes.

Grafton Whiting, statistician, referred in his report to a study being made to develop the proper basis of depreciation applicable to the fiber container industry. The container charts and summaries were reported upon and discussed.

General Manager Browder brought to the meeting's attention certain correspondence with the Bureau of Explosives with reference to the proper basis of the Mullen test. It was voted that the proper basis of test should be an average of three punctures in each direction; in other words, an average of six tests.

Joint Meeting of the Three Groups

President J. P. Brunt presided at the general meeting of the three groups, and his report covered the action and recommendations of the executive committee with respect to finances; a proposed increase in sales promotion activities; changes in the personnel of the standing committees; and a change in the booklet of standards, etc.

General Manager Browder submitted a report covering major activities of the association during the past sixty days, covering general association activities, traffic and classification matters, export trade in fiber containers, research and laboratory reports, and sales promotion and publicity.

The members elected to discontinue the contract with the Mellon Institute of Industrial Research, Pittsburgh, Pa., as of February 1, 1927. The other two laboratories one at Chicago, and the other at Rockaway, N. J., will be continued as at present.

The members of the association voted to amend paragraph 8 of the Constitution to read: "It is the sense of this meeting that we change the working hours of the industry to five days of operation, consisting of 120 hours, the sixth day reserved for the changes and repairs, and the entire elimination of all Sunday work."

A. J. Rodemski reported for the Committee on Trade Customs and Practices, and the members voted unanimously to adopt the code of ethics discussed at recent meetings, and copies will be printed and distributed in the near future.

Following the presentation of committee reports, President Brunt introduced Dr. E. O. Merchant, the Association's economist, who gave a report on "General Business Conditions and the Paperboard Industries," in which he reviewed the situation in 1926 and made a forecast for 1927.

A. F. Wilcox

A. F. Wilcox, widely known manager of the paper mill department of the U. S. Rubber Co., died January 24, 1927, at his home in Oak Park, Ill., from a number of complications of Brights disease.

He was 59 years old, and had been connected with the aforementioned company for a period of 25 years. Mr. Wilcox, through providing rubber requirements for paper mills all over the United States, became identified as a paper man, because he was so closely allied with the interests of the paper industry. He was actively engaged in all affairs of interest to the paper trade, and was one of the prominent figures at the convention in New York last November.

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Plans for Annual Meeting of Superintendents' Association

Governor of Virginia Heads Advisory Committee and Active Workers on Special Committees Issue an Interesting Program

WITH the idea in view of making the eighth annual convention of the American Pulp and Paper Mill Superintendents' Association, not only the best but the largest in attendance in the history of the Association, Cal Magnus, general chairman, and his associates at Richmond, Virginia, are hard at work on their plans. To assist in securing the attendance, a very attractive invitation is being mailed to every superintendent in America eligible to membership. The cover of the invitation carries a panoramic view of Richmond with the slogan made famous in the days of '61 to '65, "On to Richmond."

Announcement of the Meeting

The text of the invitation issued by Carl Magnus, general chairman, follows:

On behalf of the officers of the association, the pulp and paper industry of our city, allied industries, and the citizens of Richmond, I extend to you a most cordial invitation to attend the eighth annual national convention of the American Pulp and Paper Mill Superintendents' Association, to be held in Richmond, May 26, 27 and 28, 1927.

Two of the largest blotting paper mills in the world are located at Richmond, together with other mills producing book, wrappings and specialties, and supporting some 4,000 of Richmond's 180,000 people. These people are anxious to show you their city, to take you for trips through its various mills, and to make every minute of your stay just as entertaining and enjoyable as possible.

The program includes interesting business and departmental sessions in charge of capable chairmen and addressed by forceful speakers who are thoroughly familiar with their subject. The evenings will be filled with attractive entertainment features, and a special committee will see that your wife, daughter or sweetheart has a thoroughly enjoyable time while you are attending the meetings.

Come. It will be a delightful season in which to drive down. Bring your wife and children and prepare to have a big time, for we fellows here in Richmond want to show you what "Southern Hospitality" really means.

Mr. Magnus Discusses Plans

"This invitation will be followed by a series of letters outlining the program, a list of the speakers and papers to be read. Our plans are to prepare the best program in the history of the association and surround the program with Southern hospitality and trip through the most historical part of America, of which Richmond is the center," said Mr. Magnus in discussing the plans for the convention to a special correspondent of THE PAPER INDUSTRY. "My fellow superintendents have no idea what an ideal city Richmond is for a convention. For instance we have chosen the Jefferson Hotel for our headquarters, for it possesses every facility under one roof, to conduct every phase of the convention, and I do not recall any city under a quarter million population, that has a hotel that will compare with the Jefferson for facilities, and no hotel in the United States in beauty and lobby space, so necessary for the success of a convention.

With the dates of May 26, 27 and 28, selected for the convention, the weather will be ideal here, the flowers and trees in full bloom, just ideal to motor to the convention from any section of the country. And as the following Monday is Memorial Day, a national holiday, it will permit the return trip to be made through the valley of Virginia and a visit to Washington, without having to race home.

Mr. Magnus has appointed the following committee chairmen who are enthusiastic in making the convention a success from every standpoint: Advisory Committee, Harry Flood Byrd, Governor of Virginia; J. Fulmer Bright, Mayor of Richmond; Robert S. Crump, president of the Standard Paper Manufacturing Company; H. W. Ellerson, president of the Albemarle Paper Mfg. Company; Frank E. Brown, general manager Manchester Board & Paper Company; M. E. Marcuse, president Bedford Pulp & Paper Company; J. P. Hummel, president Hummel-Ross Paper Company; Ellis Olsen, general manager Chesapeake Corporation; Geo. W. Rogers, P. O. Box 90, Richmond, Va.; R. R. Robertson, general manager, Champion Fibre Company, Canton, N. C.

Finance, R. E. Winfree, chairman; Registration, H. S. Donald, chairman; Divisional Meetings, B. K. Stedman, chairman; Information and Plant Visits, E. H. Neblett; Program and Entertainment, Alvin M. Smith; Hotels, Lunches and Banquets, I. J. Marcuse; Transportation, Heth Owen; Ladies' Entertainment, R. S. Crump.

Sectional Chairmen

For the technical meetings, the following chairmen have accepted:

Chemical and Mechanical Pulp, J. A. Bowers, Hammermill Paper Company, Erie, Pa.; Board and Coarse Papers, Charles L. Ellis, Downington Mfg. Company, East Downington, Pa.; Book and Fine Writings, W. S. Brooks, Champion Fibre Company, Canton, N. C.; Newsprint, Geo. K. Walker, Finch Pruyn Company, Glens Falls, N. Y.; Mechanical Appliances, Herman S. Harrigan, District of Columbia Paper Company, Washington, D. C.

Social Features

A number of the speakers on the technical subjects have already been selected by the various chairmen. The convention and banquet speakers will be the best we can secure and as stated the entertainment will be strictly Southern, including a dance in which fifty Richmond couples will lead the Virginia Reel. The ladies' entertainment committee will see that the visiting ladies have every minute of their time taken up and the men will not have to worry about their wives while they are in attendance on the sessions. Visits to the six mills in and around Richmond and a visit to the battle fields, are two of the many outdoor attractions that have already been arranged.

Southeastern Superintendents to Meet in Richmond

The Southeastern division of the Superintendents' Association will hold its annual meeting in Richmond, Va., March 4, 1927 at the Hotel Richmond. In spite of the fact that the National Convention will meet in Richmond, May 26-28, inclusive, this meeting is of importance, as officers must be elected for the ensuing year, and arrangements completed for the National Convention.

The program promises to be a very interesting one, opening with a talk by H. W. Ellerson, president of the Albemarle Paper Mfg. Co., followed by a movie "The Rosin Industry," by the Western Paper Makers' Chemical Co. The luncheon then is scheduled, after which a paper on "Vocational Education" will be given by B. H. Van Oot, State Superintendent of Trade and Industrial Education. Another paper tentatively scheduled is on "Suction Rolls," by V. S. Denison of The Paper & Textile Machinery Co. The election of officers will follow this, and a dinner wind up the entire affair together with various entertainment features.

John G. Anderson Passes Away

John G. Anderson, for sixteen years General Manager of the Tyrone and Williamsburg mills of the West Virginia Pulp and Paper Company, and for thirty-six years one of Tyrone's most honored and beloved citizens, passed away at the Altoona Hospital on January 24, 1927.

Mr. Anderson was a Director of the West Virginia Pulp and Paper Company, President of the First National Bank of Tyrone and President of the Moshannon Coal Company.

In 1880 Mr. Anderson came to Tyrone as secretary and treasurer of the Morrison and Cass Paper Company, a post which he held until 1910 when, in the merger of this company with the West Virginia Pulp and Paper Company, he became General Manager of the plants of the combined companies at Tyrone and Williamsburg.

He was born in Keene, Coshocton County, Ohio on October 29, 1863, and is survived by his wife and sister Mrs. Ida Humrickhouse of Coshocton, Ohio.

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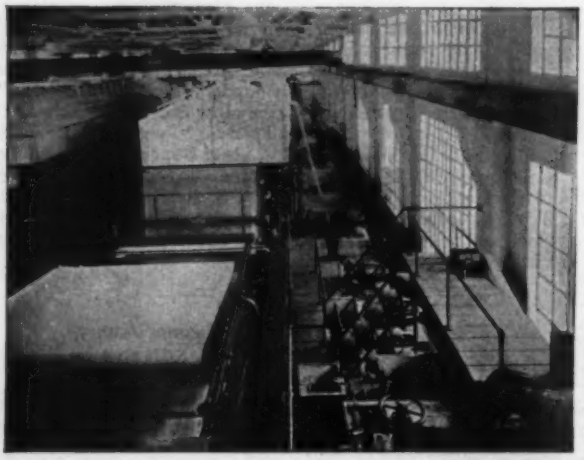

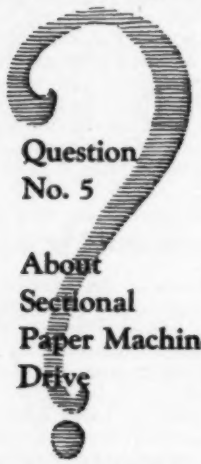

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News Briefs from Washington

Consular Reports

Italian Law for Poplar Culture—Trade Commissioner J. E. Wholean at Rome reports that the Council of the Ministry has approved a law for the development of poplar culture in Italy. This law is designed to reduce importations of wood pulp for the manufacture of paper and other products, these importations having increased greatly during the past few years. The country has extensive facilities for the growth of poplars and this law will make it possible to avoid the legal limitations imposed on the use of water in the Government's conservation program and at the same time utilize the crown lands along most desirable lines.

Norwegian Market Conditions Unsettled—The American Consul at Oslo, Norway, states that the market for mechanical pulp is showing marked improvement since the settlement of the coal strike and that advance purchases on contract are being rapidly arranged. About one third of the 1927 production of sulphite pulp is already disposed of, but the market for sulphate pulp is somewhat more slack and prices are less satisfactory. He also states that the majority of shares in the Iillestroem Cellulosefabrik pulp mill have been sold to the timber firm of Westye Egeberg and Co. This mill produces about 10,000 tons of sulphite pulp per year and employs over 200 laborers.

The American Commercial Attache at Oslo also furnishes a statement concerning the Norwegian industry in 1926 to the effect that it has been characterized largely by unsatisfactory prices and generally adverse production and market conditions. Financial returns, according to the industry's balance sheets, have been below the level of 1925. This has been attributed to the rise in crown exchange and the general downward trend in international paper prices. Other factors include the British coal strike, which caused an increase in the cost of fuel and transportation, and the domestic labor crisis which lasted for seven weeks. The wage reduction resulting from the strike settlement was insufficient to compensate for the rise in exchange and the loss of time in operation. Reports from the principal Norwegian markets indicate difficult conditions in practically every branch of the paper field. According to the representatives of the industry, the outlook for the coming year is far from encouraging, labor and production costs being so much out of line with the price of the finished product that reasonable profits seem to be out of the question. Pulpwood contracts for 1927 embody prices based on a much lower crown rate, and this will also react unfavorably on the industry.

According to the Newfoundland Trade Review of January 15, a number of timber cruisers will check up on the previous surveys of the Gander area and these arrived at St. Johns on January 13. This indicates probable developments in that section of Newfoundland during the coming summer.

Swedish Market Production High—Trade Commissioner Emil Kekich at Stockholm reviews the trend in the Swedish markets, noting that a manufacturing record was made in the Swedish cellulose industry, 1925 production being exceeded by 140,000 tons, total production for 1926 amounting to 1,430,000 tons. Of this quantity the domestic paper industry consumed about 30,000 tons of bleached sulphite, 216,000 tons of unbleached sulphite, and 95,000 tons of sulphate pulp. Total production for 1927 is estimated at over 2,000,000 tons. Although complete data for the year are not yet available officially, it is believed that exports for 1926, will also establish a new high record. Over the past year the United States has taken 33 per cent of the sulphite, and 75 per cent of the sulphate pulp. Of the 1927 production, about 500,000 tons have been contracted for in the sulphite field, this being about 57 per cent of the estimated total production.

Compared with last year the exports of Swedish newsprint showed some material changes. The most apparent was the reduced export to the United States which amounted to only a little over 25 per cent of the total exports, as against almost 35 per cent in 1925, which indicates that the United States covered its newsprint requirements largely from Canada.

Afforestation Program in North Yorkshire—Consul S. W. Eells at Leeds, England, reports that North Yorkshire plans an extensive afforestation program for the idle land of the county. It is intended to plant trees of rapid growth which will reach maturity during the normal life of a man and which are suitable for manufacture into pulp for either paper or rayon. At the present time the British rayon industry is noticeably dependent upon outside sources of supply for its raw material, and so far as pulp wood is concerned, the same statement might properly apply to the paper industry. The area which it is proposed to plant is in the West Riding of Yorkshire where, in previous generations, when there was a newly founded and rapidly growing smelting industry there, all available timber was used for making charcoal. It is proposed to grow Scotch pine, Austrian pine, and spruce.

U. S. Sales to New Zealand Fall—Vice-Consul Hudson at Wellington, New Zealand, notes that there is a decrease over the past year in the sales of American cardboard in the Dominion where there is practically no domestic industry with which to compete. Annual sales of card and boxboard of all grades average about $500,000 practically all of which is imported—confectionery, biscuit, and shoe manufacturers being the principal consumers. The United States now ranks second in this trade with less than 20 per cent of the total and with a proportion that has decreased for several years past. Better credit terms, lower freight rates, and more favorable prices offered by British manufacturers are stated to be the causes of the decrease.

French Employment Situation Acute—Although the unemployment situation in the French paper industry has not shown itself in the official statistics of the country, it is none the less quite acute, according to Commercial Attache Jones at Paris. The hours of work have in many instances been cut down 50 per cent. Many of the mills are situated in sections of the country where there is little in the way of other industry which could absorb unemployed labor with the result that employees are kept on in toto at part time rather than reduced in number. This fact has prevented unemployment from being reflected in the trade journals devoted to paper manufacturing.

Testing Resistance in Paper—A new device to test the resistance to disintegration offered by various types of paper when wet has been devised by the Bureau of Standards. The development of this apparatus grew out of the recent tests of the lasting qualities of the dollar bill and which necessitated the investigation of how paper money withstood wear when wet. In addition to the advantages derived from determining this resistance quality by mechanical rather than human means, the ability to obtain a reproducible numerical value which can be indicated on a mechanical device is highly desirable in tests of this nature. Such a test is of importance in the case of most surface-treated papers, such as blueprint, map, ledger, and similar papers. Hence, the testing device which has been developed at the Bureau of Standards for this purpose is of considerable general interest.

The apparatus consists of (a) the means of clamping the specimen of paper over a smooth hard surface, (b) a power driven rubber friction surface or mechanical finger maintained under constant pressure, (c) a means of keeping the surface of the paper wet while being tested, and (d) an automatic counter to record the number of double runs required to wear a hole through the paper, the apparatus being designed in such manner that the tester is stopped as soon as the hole appears. The development of this testing device is another example of the substitution of measurement for guesswork in the study of the improvement of materials and processes at the Bureau of Standards.

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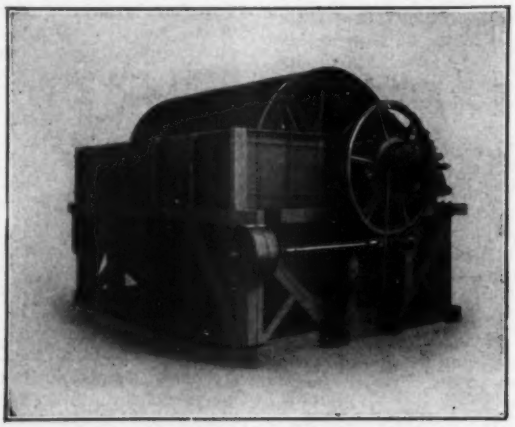

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See page 381 in the 1926 Paper and Pulp Mill Catalogue.

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MICHIGAN NEWS

Kalamazoo Valley Mills Hold Annual Elections

Changes in Personnel of Western Board and Paper Co.—The death during the last year of William H. Scott, vice-president of the Western Board and Paper Co., resulted in a change in the official personnel. Charles G. Bard was elected vice-president and C. Hubbard Kleinstuck was named on the board of directors.

Allied Paper Mills Overcome Setbacks—The Allied Paper Mills enjoyed excellent business during 1926 and the year is counted as a generally successful one, despite the unfortunate accident that accounted for heavy property loss in the engine room of the King division. Those damages have been fully repaired and the various plants of the corporation are in excellent physical condition.

These facts were developed at the annual meeting of the stockholders, held Wednesday, Jan. 26, 1927, in the executive offices. The annual election resulted in renaming all officers and directors.

Changes in Hawthorne Paper Co. Officers—The official personnel at the Hawthorne Paper Co. has been materially changed as the result of the selection of George H. Gerpheide to succeed the late A. H. Dwight as president of the company. E. W. Chase succeeds Fred C. Clark as secretary. George H. Gerpheide, F. M. Hodge and A. E. Curtenius have been added to the directorate.

Superintendents Hold Meeting

Although the regular monthly meeting of the Michigan Division of the Superintendents' Association was postponed from January 20 to 27, so that Mr. Rooney, the national president, could attend, through some unforeseen happening, he was unable to be there at the latter date, when the meeting was held at the Park-American Hotel, Kalamzoo, Mich.

R. H. Hayward on Paper Mill Problems—The speaker for the evening was R. H. Hayward, general manager of the Kalamazoo Vegetable Parchment Co., who spoke on "Paper Mill Problems," and went into considerable detail, explaining the centers of the industry, just what made for the centers, and what hope each section had for growth.

The next items he discussed were power and nearness to markets as influential factors in the industry. He stated that the power cost in Kalamazoo was exceedingly high, but that the mills were excellently situated for markets, being close to Chicago, Detroit, and midway between the Far East and West.

In discussing labor, he stated that Kalamazoo had an excellent labor supply for the making of the better grades of paper. In doing consulting work for mills, where the labor problem was a serious one, treating a man fairly resulted in his feeling king of the mill and he had to be tolerated, while in Kalamazoo this is not the case since labor is plentiful and of a good class.

Mr. Hayward believes the time is coming when labor will be paid for what it does and not have a set scale for each job. He further stated that a man will put a lot more into his work if he gets paid for what he does, rather than the same amount as some other fellow doing the same job.

From labor, Mr. Hayward took up the discussion of various bonus and profit sharing plans that are in operation in different industries. Starting with the Ford plan, which he explained in detail, he then took up piece work, and finished up with a discussion of the Hammermill system.

Attendance—Those present were: George H. Pountain, Thomas Wallington, Jack Spoor, Joe Dennany, W. M. Carroll and H. DeYoung, Allied Paper Mills; G. S. Brazen, Appleton Machinery Co.; Alfred Bryant, N. Collignon, E. H. Gilman, E. G. Milham and A. F. Fisher, Bryant Paper Co.; Vic Troyer, Constantine Board and Paper Co.; J. F. Carrigan, E. R. Brecher, French Paper Co.; E. M. Conling, H. E. Stafford and O. V. Comstock, Hawthorne Paper Co.; M. Redmond and J. M. Jagers, Kalamazoo Paper Co.; R. H. Hayward, Kalamazoo Vegetable Parchment Co.; F. S. Brown, C. B. Barton, Jr., George J. Maye, C. J. McMahon, Archie Brown and Elmer East, Michigan Paper Co.; J. Kuss, A. W. Riedel, Gus Riedel & Sons; C. C. Thorne, C. J. Chamberlain and Art Woolam, Watervliet Paper Co.; W. H. Sievert, Michigan Carton Co.; E. J. Turner, Western Paper Makers Chemical Co.; Throney Keng, Westinghouse Eelectric, and Clarence Pountain, THE PAPER INDUSTRY.

Group Bonus Plan Outlined to Cost Body

Merits of the group bonus method as a leader to a better wage for employees and added profit to employers were discussed on Wednesday evening, Jan. 26, 1927, at the dinner session of the Kalamazoo Valley division of the Cost and Technical Association of the paper industry.

Address by Cost Expert—The speaker, E. G. Vender, Detroit, manager of the system staff of Ernst & Ernst, in addressing a group of paper mill workers and officials, declared he had no report available as to the workings of his plan as applied to paper mills, but that he has been employed to project such a system for a paper manufacturer and would be able to report something really tangible along that line in three to six months.

Mr. Vender asserted that since most paper mills operate on the day work plan, and few on piece work, many of them are possibly not scientifically set to adopt the bonus plan as yet, and when not scientifically worked out, it will not function, for it must be based on good will. He further declared that close scrutiny showed that the average day worker in any industry produces only 40 to 70 per cent of his true value, and could that percentage be made to approach the 100 mark, the saving would be great.

Not having a paper mill instance to quote, Mr. Vender selected the case of a steel mill as applied to the industry of paper making. This example showed that the cost of handling the raw products was reduced from 35 cents to 19 cents a ton, while at the same time increased pay was granted.

Plan Relieves New Employee Situation—One interesting feature of the bonus plan that he stressed was the alleviation in the placement of new employees, one that is a difficult matter for employers. Under this group bonus system, the group workers soon judge a worker's efficiency, and the dissatisfied worker must answer to his fellow employees as well as to the management. Employees will always help a fellow worker who is williing to learn and eager to increase production, thus increasing pay.

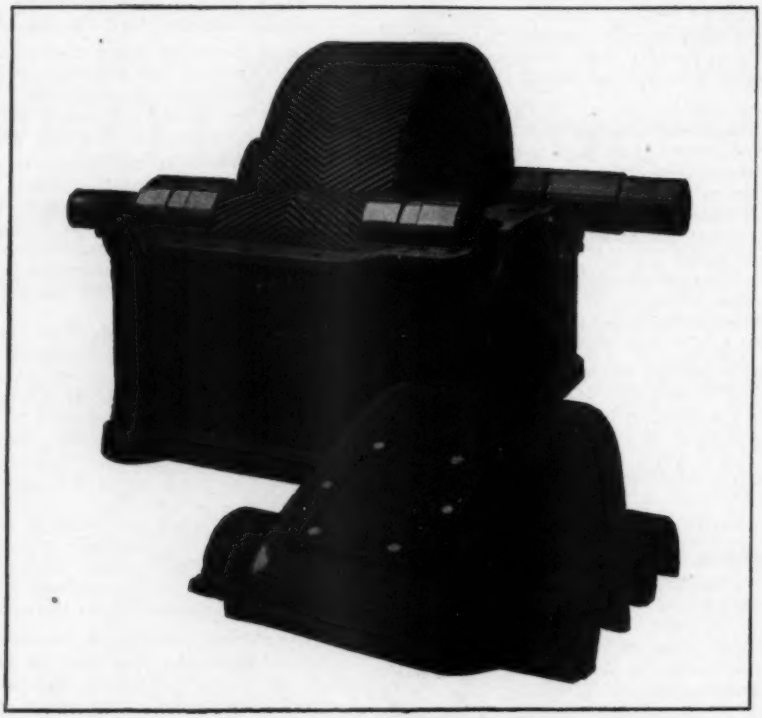
Mr. Vender further stipulated that in reviewing the system and methods employed, it is often necessary to sell the advantages to employers who are unwilling to have their workers make so much money. The only hope for success in the adoption of the plan is for the company to keep faith in its workers. He was able to show through many specific cases where he had been able to show through the group bonus plan a saving of 35 to 45 per cent in day labor costs and 20 to 25 per cent in piece work costs.

Mr. Vender made it clear that in union shops the men are always satisfied with the plan, providing a union representative is allowed to be present when the scale is fixed, and the workers receive what is termed union pay or better.

Two Other Papers Given—There were two other papers given during the meeting,—one by Prof. Lemuel F. Smith of Kalamazoo College, on "Value of Research Work," and the other by J. H. Millsap of the International Accountants' Society on "Interpretation of Financial Statements."

The Cheney Pulp and Paper Co., of Franklin, Ohio, are equipping their plant with electric motors, and will purchase their power from the Union Gas and Electric Co., of Cincinnati. They are also making numerous other improvements, among which is the laying of concrete floors. Their production is being increased, and their product improved by these various changes.

Late in 1924 the Carthage Machine Co., of Carthage, N. Y., established a branch plant at Belleville, which recently completed its first full year of production. The value of the output runs well into the hundreds of thousands of dollars, and the Belleville factory bids fair to outstrip in importance the parent company at Carthage.



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WISCONSIN NEWS

Re-organization of Kotex Company

Press dispatches from Chicago reporting the reorganization of the Kotex Co., of Neenah, formerly known as the Cellucotton Products Co., inferred that the controlling interest of the company was about to be acquired by several Chicago investors.

Company officials at Neenah, while admitting that a block of newly issued preferred stock has been sold, declared that the Kotex Co. has not "sold, or negotiated the sale of, the control of the company to any persons or corporations."

"The facts are," it was stated, "that a reorganization of the Kotex Co. has recently been completed, which made additional financing necessary, and a preferred stock was issued. A. D. Lasker, of the Lord and Thomas and Logan Advertising Agency, which does the company's advertising, Charles Pearce, of the Palm Olive Co., and several other investors purchased this preferred stock as an investment."

The Kotex Co. about ten days ago announced the proposed removal of its general accounting offices to Chicago. The sales offices had previously been moved there for the sake of the better marketing facilities. Plans for expansion of its manufacturing units will be developed in the east, it was made known.

The board of directors of the Consolidated Water Power and Paper Co., of Wisconsin Rapids, contains two new members to succeed I. P. Witter, who recently sold out his interest to George W. Mead, president, and G. P. Berkey, who lately resigned as manager, and is now identified with the Crown-Willamette Co., on the Pacific Coast. The new directors are E. B. Redford and Stanton W. Mead. Mr. Redford was elected secretary and S. W. Mead, son of G. W. Mead, as treasurer. The other directors were reelected. They are: George W. Mead, president and general manager; R. L. Kraus, vice president, and T. W. Brazeau. The company has just completed twenty-five years of successful business in the pulp and paper manufacturing field, and now operates mills at Wisconsin Rapids, Appleton, Stevens Point, Biron, Wis., and Port Arthur, Ont., Canada.

Three officials of paper mills have been appointed by the State Industrial Commission on a committee to study an unpopular law which compels factories to give twenty-four hours of consecutive rest once a week to their employees, and which is working a hardship on paper mills because of conditions peculiar to this industry. The appointees are S. F. Shattuck, of the Kimberly-Clark Co., Neenah, D. C. Everest, of the Marathon Paper Mills Co., of Rothschild, and W. J. Peacock, of the Northern Paper Mills, Green Bay. Ways and means will be sought either to make compliance with the law possible or to show that the law is impossible of enforcement.

R. C. Bay, general manager of the Lakeview Paper Co., of Neenah, Wis., owned by Sears, Roebuck and Co., Chicago, has resigned in order to remove to Lakeland, Florida, where he will develop a fruit farm. He had been identified with Sears, Roebuck & Co. for nearly twenty-five years.

Progress has been noted in Northern Paper Mills, of Green Bay, which recently declared its first dividend in five years. The return was not very large, because the first necessity was to pay accrued earnings on the preferred stock. A greater amount could also have been paid the holders of common stock, but it was thought advisable to leave surplus until the two big hydro-electric power projects at White Rapids and Cjalh Hills are completed. The company has made excellent progress since Judson G. Rosebush, of Appleton, became executive head of the company a few years ago.

An outgrowth of the Fox River Valley Safety Conferences organized two years ago are the two safety schools to be conducted at Appleton and Green Bay for foremen and others interested, starting the second week in February. Men of prominence and safety experts have been engaged as speakers. Sectional meetings for paper mill men and others will be held.

Operations are soon to start in the newly organized Menasha Paper Mills which a few months ago purchased the defunct Island Paper Co., of Menasha, Wis. About seventy-five men have been employed in remodeling the mill and installing new machinery. Straw board will be manufactured.

The Great Western Paper Co., of Ladysmith, Wis., recently made a purchase of 5,000,000 feet of hemlock logs for purposes of paper manufacture. This is said to be one of the biggest log sales ever made in this region.

G. P. Berkey, former manager of the Consolidated Water Power and Paper Co., Wisconsin Rapids, and Frank N. Youngman, until recently manager of the company's mill at Thunder Bay, Ont., Canada, have both become associated with the Crown-Willamette Paper Co. Mr. Berkey is now its vice-president and Mr. Youngman has been made manager of the company's subsidiary, the Pacific Mills Co., Ltd., with executive offices at Vancouver, Washington. Mr. Berkey will be located at Portland, Oregon, for the first year.

The United States Supreme Court to whom the case of the Fox River Paper Co., of Appleton, Wis., contesting the constitutionality of the Wisconsin recapture clause with reference to seizure of water power, has postponed the hearing until April 11. It will be held at Washington, D. C. The company was refused permission by the Wisconsin Railroad Commission to rebuild a dam in Appleton unless it submitted to the recapture clause whereby the state would at the end of 30 years have the right to take over the dam at a present-day valuation.

The Kimberly mill of the Kimberly-Clark Co. won an inter-mill safety contest with the company's mill at Niagara, Wis. The final score was: Kimberly, 632 points; Niagara, 624 points.

Election of directors and officers at the annual meeting of the Nekoosa-Edwards Paper Co., of Port Edwards, Wis., two weeks ago resulted as follows: L. M. Alexander, president and treasurer; J. E. Alexander, L. E. Nahs, and Judson G. Rosebush, vice-presidents; C. A. Casperson, secretary; L. M. Hanks, G. W. Kibby, and J. B. Nash, directors in addition to the officer directors.

All of the Kimberly-Clark Co. mills have enrolled in the safety contest conducted by the National Safety Council. The Neenah mill won THE PAPER INDUSTRY cup last year.

Safety meetings are being held monthly by department heads of the Bergstrom Paper Co., of Neenah, Wis.

Fort Howard Paper Co., of Green Bay, Wis., has organized first aid classes, and the same has been done by the Northern Paper Mills, of the same city. Courses are being given in co-operation with the Green Bay Vocational School.

J. G. Noyes, who made a paper mill survey in the vicinity of Appleton previous to beginning courses in paper and pulp manufacture, in connection with the Appleton Vocational School, is now conducting a similar survey in Green Bay for the purpose of paper mill instruction in the Vocational School of that city.

The Thilmany Pulp and Paper Co., with mills in Appleton and Kaukauna, is offering an issue of $800,000 in first mortgage 5½ per cent serial gold bonds. The fixed assets of the company are placed at $3,100,000 after depreciation, and the quick assets are given as in excess of $1,622,599.

The Cleveland Worm & Gear Co., 3249-99 East 80th Street, Cleveland, Ohio, announces the establishment of a new district sales office in Detroit, Mich., at 2600 Buhl Bldg., with Mr. H. A. Sparrow in charge as district manager. This office will serve the lower peninsula of Michigan.

Announcement To The Paper Mills

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Have taken the exclusive sub-license from the American Voith Contact Co., to manufacture, sell and install —

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A HIGH PRESSURE VAPOR REMOVAL SYSTEM FOR PAPER MACHINES

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Canadian Section

Hydro-Electric Developments Versus Industrial Expansion

Hand in hand with the growth of the newsprint and mining industries of Canada has gone the development of her great water power resources. Hydro-electric development is so great a factor in the success of these industries that they could never have reached their present flourishing state without its aid.

The modern development of water power in Canada began in the last decade of the nineteenth century. At the close of the year 1900, 170,000 horse power was installed and at December 31, 1925, Canadian plants were generating 4,290,428 horse power, or an increase of over 2,523 per cent.

Last year was one of exceptional activity in the construction of hydro-electric plants, and a total of 266,000 horse power was brought into use during the year. This figure, however, falls short of indicating the magnitude of constructional activity during the year. Projects are actually under way, a number of which are nearing completion, which will add to the Dominion's total more than 1,700,000 horse power, while others in active prospect promise a further addition in excess of 1,000,000 horse power.

Quebec took the lead in 1926 with 168,000 horse power, followed by British Columbia with 45,800, Manitoba with 43,200, Ontario with 5,700, New Brunswick with 2,600, and a small addition in Nova Scotia. The small addition in Ontario is largely attributable to the completion in 1925 of a very large program of construction which had extended over several years, and as a result a certain period must elapse before new projects commence to add their quota to the provincial total.

The outstanding achievement of the year was undoubtedly the work accomplished by International Paper's subsidiary, the Gatineau Power Co., in the virtual completion of its two plants on the Gatineau River at Chelsea and Farmers Rapids and the beginning of construction at Paugan Falls, the three plants having a total designed capacity of 530,000 horse power. Construction was also commenced of plants on the Bridge River, B. C., with an ultimate capacity of from 550,000 to 700,000 horse power, the Saguenay River at Chute à Caron with an ultimate capacity of 800,000 horse power, and an addition to the Duke-Price plant at Ile Maligne, also on the Saguenay, which will bring the ultimate capacity from 450,000 to 540,000 horse power.

Vegetable Parchment Industry Asks Protection

The Canadian Vegetable Parchment Co., of Merritton, Ont., has applied for a greater measure of protection for this product, of which it is the only manufacturer in Canada. There was a public hearing on this application before the Dominion Tariff Advisory Board, and considerable opposition was voiced from representatives of farming interests west of the Great Lakes.

Senator Belcourt, supporting the application, stated that the classification of this paper under a rating providing a 25 per cent duty was merely due to a misunderstanding on the part of the customs officials and the Department of Finance. There was no real need for an increase in the tariff: this product is really a manufacture of paper, and as such should be subject to a 35 per cent duty. The only difficulty lay in the refusal of the Customs Department to put butter wrappers under their proper classification.

No decision was handed down, and a further hearing will be held.

It has just been announced that the winners of the "Pulp and Paper Magazine of Canada's" trophy for the safest mill in Canada are the Spruce Falls Power and Paper Co., Kapuskaing, Ont., in class A, and the Don Valley Paper Co., of Toronto, in class B. Detailed results are not yet available.

QUEBEC

Government May Limit Number of Paper Mills

In the address from the throne at the opening of the Quebec Legislature on January 11, there was that which will undoubtedly prove reassuring to investors in the securities of pulp and paper enterprises. A suggestion was made that the companies presently operating will be afforded all possible protection against the overcrowding of the industry and the resultant depreciation of their securities. This is almost a confirmation of the policy set forth by Hon. Honoré Mercier, minister of lands and forests, who last year, in reply to criticism as to the Government granting limits to a large company, drew attention to the great benefits which the operations and expansion of such companies has brought to the province. He further called attention to the fact that to safeguard their investment and progress here, they would have to be given access to limits which would assure them a certain degree of permanency in operation.

This is a factor to which attention has been called in the past as being a possible offset for the rapid increase in new tonnage being installed in this country. It is a step in the direction of placing the industry on a sounder basis and will be quite generally recognized as in keeping with the tremendous importance of the pulp and paper industry for Canada. It will prevent the mining of Canadian forests for the benefit of outside consumers and will facilitate consolidation of the industry in a manner which will permit of the realization of the greatest benefit by the country and the greatest advantages for those who have risked their money in the expansion of the industry in the face of many adverse factors.

The recommendation referred to was as follows: "The success of the pulp and paper industry in Quebec has brought hither the establishment of great mills which make considerable demand on our forest resources. The Government intends to protect these mills by following up actively its policy of safeguarding the forest, replanting, wise exploiting of the new Quebec reserves, and the inventory of our forests, an inventory now completed over an extent of 11,000,000 acres. At the same time it thinks that before favoring the establishment of additional mills, it would be wise to see that there is an abundant forest reserve for the mills already in existence or the construction of which has been decided upon, except, however, in those new regions where such mills might become the source of unlooked-for activities."

This policy, if adhered to, will mean the end of small companies springing up, developing a nuisance value which would force their purchase at too high prices by larger companies. It will also mean the end of the breaking of the market for Canada's greatest individual manufactured commodity. This is one of the factors which has made it possible to minimize the possible effects of overproduction in the newsprint industry this year.

Notice has been received by the Minister of Lands and Forests that the Portneuf Power Company intends to apply for permission to construct a dam, power house and other works on the St. Anne de la Pérade River at or near St. Alban, Portneuf County; that the St. Maurice River Boom and Driving Co., Ltd., of Three-Rivers intends to erect a pier and enlarge its booms on the St. Maurice River at Grandes Piles, and that Price Brothers intend to build a dam to facilitate the flowing of logs on the west branch of the Humqui River, in the Matapedia, and to approve side wharves above this dam.

Among the latest notices of application to the Legislature received by the clerk of the Private Bills Committee, is one

Good shipping rolls—

—right off the end of your paper machine, can be produced with a Cameron Slitting and Roll-Winding Machine. The type recommended for efficient long-lived service is the CAMACHINE 18. It will keep ahead of your paper machine whatever its speed and will slit and wind good shipping rolls.

CAMACHINE 18 is a mill type roll-winder designed for every service in the paper or board mill, whether used as a winder behind the paper machine or as a rewinder in the finishing room.

THE PAPER MILL MODEL is built in widths from 92" to 162", and will wind rolls to a maximum diameter of 42".

THE BOARD MILL MODEL is built in widths from 92" to 142", and will wind rolls to a maximum diameter of 60".

The CAMACHINE Principle of Score-Cutting and Surface-Winding employing two drums and riding roller, is your assurance of steady, trouble-free service and of high speed production of good rolls.

Send for our catalogue of Mill Type Winders.

CAMERON
Machine Company

61 POPLAR STREET, BROOKLYN, NEW YORK.

providing for incorporation of a new town under the name of Mistassini. This town will be the site of the new mill of the Lake St. John Power and Paper Co. (formerly Mistassini Power and Paper Co.), to which the Canadian National Railway is to extend its lines.

Supplementary letters patent have been issued for the increase of the authorized capital of the Port Alfred Pulp and Paper Corporation to $6,000,000.

The first unit in the Chelsea power house of the Gatineau Power Co., a subsidiary of the International Paper Co., was turned over for the purpose of tuning up one year and seventy-seven days from the commencement of construction. This is the first of the five 34,000-horse power units which are being installed in this power house, one of three which the company is building on the Gatineau river.

Hellstrom Organizes Equipment Firm

Paper Machinery Limited is a new company organized for the purpose of handling the exclusive representation of outstanding Scandinavian engineering firms and pulp and paper mill equipment works. It has been formed by L. M. G. Hellstrom, well known Scandinavian engineer, who has been over here for some time representing Scandinavian pulp and paper machinery works and engineering firms dealing in equipment for the mills. The equipment will be either manufactured here according to the Scandinavian designs or else imported directly as may be found best in each particular case.

Paper Machinery Limited was formed by Mr. Hellstrom in conjunction with three well known firms on this continent, one a very well-known Canadian foundry, another a Canadian machinery company with long experience in the manufacture of pulp and paper mill equipment, and the third a New York firm of reputation which has large dealings with pulp and paper mills and which will handle the United States business of the new organization.

The head office of the new company is at 412-413 Drummond Building, Montreal, and Mr. Hellstrom is the managing director.

Despite high wages that are offered, there is a scarcity of lumberjacks in the timber camps of the province, and a great number of men could still be usefully employed in the different sections, according to G. C. Piché, chief of the Forestry Department. The timber cut, however, will exceed that of last year by 15 to 20 per cent, the figures for last year being exceptionally high, reaching a total of 1,600,000,000 feet.

It is reported that the Western Quebec Paper mills are preparing to go into the manufacture of toilet paper as an addition to their lightweight lines. Although not as yet in production in this line, the company has turned out a sample run, and it is expected that within a short time the manufacture of toilet paper will be in progress on a moderate scale.

The St. Maurice Valley Corp., have been authorized by supplementary letters patent to increase their share capital by the creation of 350,000 additional common shares without nominal or par value. The additional common shares may be issued for such consideration as the directors of the Corporation may from time to time determine. The Corporation will be carried on with a capital of $10,500,000.

Although the Canada Paper Co. was taken over recently into the St. Maurice Valley Corp., no change is being made in the operation and continuance of the company. It is considered that the new arrangement will be a benefit to all concerned, particularly as regards manufacturing and owing to the advantage of combining woodlands.

Canipco Jottings

Interesting particulars recently were given in the Legislature by Premier Taschereau regarding activities of the company. It has in the Province, works—either completed or in the course of construction,—to the value of $111,000,000. In order to regulate the flow of the Gatineau River it was necessary to build a dam near the headwaters, and the company offered to pay the Government the sinking fund and interest on the amount of money required for the enterprise. The Government refused, but authorized the company to construct the dam at its own cost, which will be around $4,000,000, under the following conditions: (1) The company will do the work itself under control of the Government engineers (2) When the dam is completed it will become the exclusive property of the Province without the expenditure of a cent (3) The company will pay the Government $35,000 a year for the use of the water.

P. J. Smith, superintendent of the sulphite mill of International Paper at Corinth, N. Y., has been transferred to the Three-Rivers mill, where he will be associated with C. W. Walker, who recently assumed the management of the Three-Rivers mill having formerly been head of the Hudson River mill for many years.

Canadian International Paper Co., announces the election of the following board of directors: Hon. R. B. Bennett, K. C., Calgary; Hon. Raoul Dandurand, Montreal; V. M. Drury, Montreal; Gordon C. Edwards, Ottawa; J. H. Fortier, Quebec; Hon. Sir Lomer Gouin, Montreal; A. R. Graustein, New York; Neil C. Head, New York; John R. Macomber, Boston; Geo. H. Montgomery, Montreal; J. M. McCarthy, Quebec; J. W. McConnell, Montreal; H. C. Phions, New York; Hon. Donat Raymond, Montreal; T. A. Russell, Toronto; F. N. Southam, Montreal; Hon. Smeaton White, Montreal; Brig.-Gen. J. B. White, D. S. O., Montreal; A. H. Wiggin, New York, and E. R. Wood, Toronto. In some quarters significance is attached to the fact that three Laurentide representatives are among the fifteen new Canadian directors of the Canipco board. It is also worth noting that Hon. R. B. Bennett is the largest shareholder of the E. B. Eddy Co., of Hull, which rumor has frequently linked up with the Canadian International Paper Co.

Six employees of the E. B. Eddy Co., of Hull, recently had a narrow escape from death by suffocation while engaged in fighting a fire which broke out in the chip bins in the sulphite mill. Four of the men were removed to the hospital in a rather serious condition, suffering from inhaling smoke, while the other two received only minor lung injuries. The damage from fire is reported to have been slight.

Port Alfred Mill Completed

Towards the end of last month Port Alfred Pulp and Paper Corporation started up their fourth and last machine. When the mill was taken over from the Saguenay organization, it was producing 120 tons of sulphite a day, when it was decided to erect a 200-ton news mill with the required groundwood mill, and at the same time to enlarge the capacity of the sulphite mill to maintain a production of 120 tons a day in excess of the requirements of the newsprint mill.

Ground was broken in August, 1925, and the first machine was started up towards the end of May, 1926. But before even the first machine was in operation it was decided to make the mill twice as large as had been decided at first, and now, less than eighteen months after breaking ground, the four machines, with a rated capacity of 450 tons per day, are all in operation.

Quebec Pulp and Paper Mills, Ltd., with groundwood mills at Chicoutimi and Val Jalbert, having a combined capacity of 500 tons of groundwood a day, are considering the advisability of erecting a news mill at Chicoutimi.

ONTARIO

Port Arthur vs. Thunder Bay Company Agreement Approved

By a vote of 1,107 to 76 the ratepayers of the town of Port Arthur approved of the agreement passed a short time previously by the Council. It provides that the company will spend several million dollars in the establishment of a paper industry at Port Arthur, with a rated capacity of 400 tons per day. The pulp and paper mill is to employ 700 men continuously, in addition to these required for operations in the

The Town Crier of Today

OYEZ! Oyez! Oyez! All men are commanded to give ear, for neither government nor business can continue without a concert of action based upon a mutual understanding.

From medieval times to the present day, the Crier has served to give publicity to proclamations. True enough, he is to be found today only as a relic of court room procedure. But once it was his serious business to let the wide world know that king or council, mayor or merchant had some important news to proclaim to the listening populace.

Now we do it better. We reach the eye rather than the ear. Whether it be a proclamation of thanksgiving or an announcement of wares to vend, the printed sheet, pervasive, persistent and easy to understand, takes the message and spreads it with diligence and certainty. Paper has become the Public Crier.

Hammermill Paper Company

Erie, Pennsylvania

woods. Work on the project is well under way and indications are that the number of men employed will be above the minimum stipulated in the agreement.

A course of five lectures on the manufacture and technology of pulp and paper is being given at the University of Toronto by T. Linsey Crossley. The lectures are given from 9 to 10 on Tuesday mornings, in the Mining and Chemistry Building, and were begun on Tuesday, January 11. They are being given to the fourth-year Chemical Engineering and Forestry students, but are free to others and the public upon registration at the office in the Chemistry and Mining Building.

Canadian Cellulose Co., a Howard Smith Paper Mills Subsidiary, expects to have its new mill in Cornwall in operation soon and to be turning out between forty and fifty tons of soda pulp per day. The ultimate capacity of the plant will approximate 100 tons a day.

At Iroquois Falls

L. R. Wilson, vice-president and managing director of Abitibi and president of the Canadian Pulp and Paper Association, spent the first week of January at Iroquois Falls, and had as his guests Alexander Smith of New York, president of Abitibi, Percy B. Wilson, vice-president of Spanish River Pulp and Paper Mills, and George Chahoon, president of the Laurentide Co.

Dr. R. D. Menzies, in charge of the medical service in the woods department, has inaugurated something that will be of great benefit to the camps. As the truck goes up and down to the camps every day it will carry a folding stretcher attached to the roof and a small cupboard in the corner will carry blankets and a first-aid kit, enabling a man who is injured in the woods to be given first-aid treatment, put on the stretcher and brought by the truck to the hospital.

Effective January 1st, C. B. Davis has been appointed assistant manager of the woods department and of the Abitibi Transportation and Navigation Co., C. Harris has been appointed district superintendent of logging for the La Reine district, and T. Gibbons has been appointed general superintendent of logging.

Ed. Silver, paper mill superintendent, has been promoted to general superintendent as successor to J. E. Patterson who is now mill manager. Fred B. Haynes, boss machine tender, has been appointed to succeed Mr. Silver as paper mill superintendent.

The production of the mill during the past year has run up considerably above earlier expectations. It is reported that the increase is about 9,600 tons for the year, as compared with 1925, the total production for 1926 slightly exceeding 164,000 tons, representing an average daily output of 533 tons of news as compared with an even 500 tons in 1925 and slightly under 489 tons in 1924. This is a gain in net daily average production of nearly 45 tons in two years, obtained without adding any paper machines, but by improving the efficiency of the existing machines to a point where they are turning out 33 tons above their original rated daily capacity of 500 tons.

On Friday, January 7th, Number 7 machine, a big 234-inch Walmsley machine, turned out practically 107 tons in 24 hours. The largest production which had previously been turned out on that machine in 24 hours was 103.15 tons, on August 24, 1926.

Niagara Mills Must Find New Water Supply

The residents of Merritton and Thorold, and the paper mills in the Niagara district are confronted with a serious crisis in the matter of an adequate and purified water supply. According to Major Bell, of the Department of Railways and Canals at Ottawa, after April 15th there will be 7,800,000 gallons of muddy water carried daily by suction dredges into a disposal basin, from which it must return into the canal when construction work is resumed in April.

With the water supply in such a condition complications with the provincial board of health are bound to come, and paper mill production will be seriously interfered with.

There Isn't A Stuff Pump Like It

WARREN

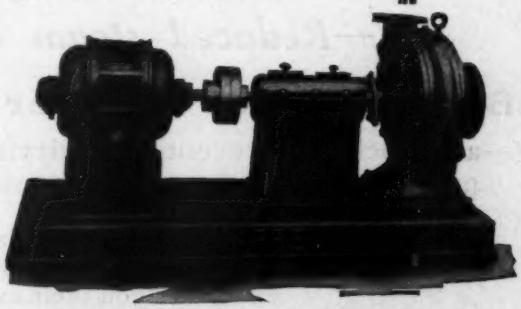
Several have tried but none have succeeded in duplicating the Warren Stuff Pump for efficiency and continuous dependability.

Take the Renewable Case Liners—an original Warren feature that assures close running clearance between impeller and casing and, consequently, high efficiency for the life of the pump.

And look at the massive single pedestal supporting both plain and thrust bearings. It assures perfect alignment.

These and other Warren design refinements plus Warren's twenty-nine years of specialized experience and unsurpassed construction and testing facilities make the Warren Stuff Pump the outstanding choice for handling pulped stocks up to 5 per cent and higher consistencies.

Write for Bulletin.



Warren
Steam Pump Company
Incorporated
Warren, Mass.

Boston Philadelphia Atlanta Chicago St. Paul Scranton Toronto New York San Francisco Pittsburgh

597

Fact....Time....Extent

Often, in the Process Industries, it is essential or highly advisable to have a continuous, definite record of mechanical operation—of machinery, elevators, hoists, conveyors, the opening or closing of doors, gates, valves, etc.

Such records assist in the harmonizing of plant operations and their accurate control—which constitute **good plant management** . . . which, in turn, ensures economical production.

Bristol's Mechanical Motion Recorder automatically charts not only the fact of the operation, but also the time and extent of the mechanical movement.

Bristol's Electrical Operation Recorder—which automatically records the fact, time and duration of operation—can be had in either Round Chart or Strip Chart model. The former can record on one chart any number of operations up to 12; the latter model, any number up to 20.

The Bristol Company *Waterbury, Connecticut*

FOR 56 YEARS — MAKERS OF — BRISTOL'S — RECORDING — INSTRUMENTS

Branch Offices:

Boston	New York	Philadelphia
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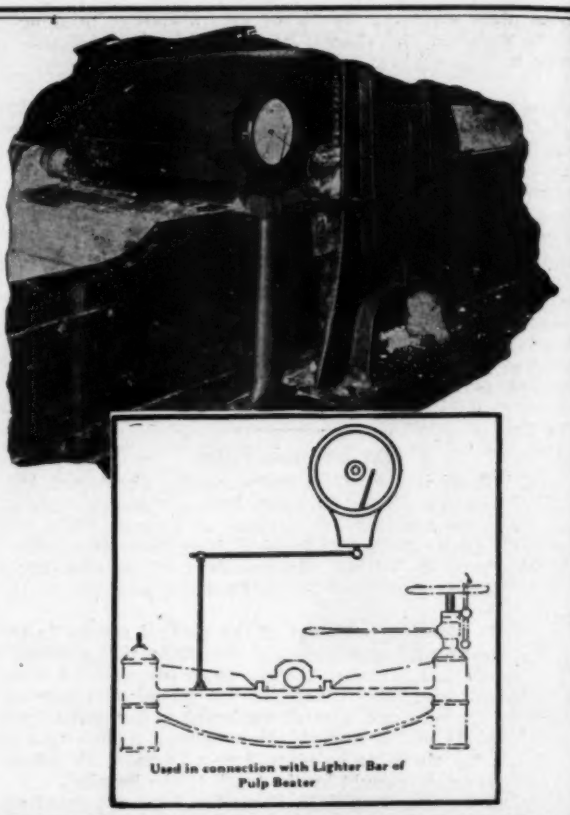
Chicago	St. Louis	San Francisco



Used in connection with Lighter Bar of Pulp Beater

DRY PAPER EFFICIENTLY
The Fulton Dryer Drainage System

—Increased production
—Decreased steam pressure on the dryers
—Reduced steam cost for drying

Better Sheet—Better Finish—Less Shrinkage

—and cockling prevented by drying with graduated temperature — Less pressure or vacuum on paper machine dryers.

We will gladly refer you to mills using the Fulton System and making the same grade of paper as you. They will tell you their experience with the Fulton System.

U. S. Patents Dec. 10, 1919, and June 7, 1921. Canadian Patents July 6, 1920, also patents pending.

Fulton Engineering Co.
MIDDLETOWN, OHIO

The Beveridge Supply Co., Ltd., 628 St. Paul St. W., Montreal, Canadian Representatives

Various plans are being considered with a view to bringing water to Merritton and Thorold from St. Catharines, but none of them have as yet been adopted.

A new company which will include the manufacture of pulp and paper making machinery in its line, and to be known as the Canadian Power Specialty Co., has been formed, largely through the efforts of G. B. Greene and of the General Supply Co. of Canada, Ottawa, and G. R. Cottrelle, of the Bank of Commerce, Toronto. The company has purchased the plant and business of the Engineering and Machine Works of Canada, located on the Welland Canal at St. Catharines. In addition to building marine boilers, pulp and paper machinery, and general mill equipment, which were formerly produced at the St. Catharines plant, the new company will manufacture, under exclusive Canadian rights, important power plant equipment heretofore made only in Great Britian and in the United States.

The Provincial Paper Mills have been tuning up the new machine which they have installed in their Port Arthur division to manufacture a superior grade of half-tone news, and the machine is now in regular operation.

T. A. Weldon, vice-president of Provincial Paper Mills, celebrated his 73rd birthday recently. He is one of the most active men around the head office of the company.

When the new boiler is installed at the Kenora Paper Mills, Kenora, the paper production will be increased from 225 tons to 250 tons daily.

Since the installation of the new First Aid Station, together with a capable staff, co-operation among all the departments has greatly improved the accident record. The number of men receiving compensation has been reduced by 70 per cent, the number of accidents in the mill has been lessened by 50 per cent and the number of hours lost by 60 per cent, proving new department's efficiency from the very start.

The railway survey of the new line from Kenora to the English River, which was started in May last, is being continued, and it is expected that construction will begin in the spring. Every mile of the new road will open up new pulpwood areas.

E. W. Backus recently expressed the progress on the construction of the extensions to the newsprint mill at Fort Frances as being expected to start running in March or April.

MANITOBA

Controversy Over Pulpwood Grants

The outcome of a controversy between the Department of the Interior at Ottawa and the Provincial Government of Manitoba over disposition of some remaining pulpwood areas in that province depends the question of whether or not a second newsprint mill, with a minimum daily capacity of 250 tons, will be built in Manitoba by the Backus-Brooks interests within the coming year, or whether the Manitoba Paper Co. will expand its present mill at Pine Falls to more than twice its present capacity, making it a 250-ton mill.

Under a contract already in existence between the Dominion Government and the Manitoba Paper Co. the latter claims an option upon an additional 1,800 square miles of timber lands, estimated to contain 2,000,000 cords of wood, in return for which it agrees to proceed immediately with the enlargement of its mill to a capacity of 250 tons. On the other hand, E. W. Backus, of the Minnesota and Ontario and of the Fort Frances Pulp and Paper Companies, is an applicant for a lease involving some of the same timber limits covered by the Manitoba Paper's option; and he has agreed, if granted the concession, to erect a 250-ton mill within the greater Winnipeg district, which would mean some sixty miles closer to the city than the mill now located at Pine Falls.

Hon. Charles Stewart, Federal Minister of the Interior, has stated that he is prepared to give the Manitoba Government full information regarding the new pulpwood deal, but he does

How a certain paper mill saves money washing sieve cloths with OAKITE

WASHING felt sieve cloths the OAKITE way pays. In time saved, in cleaning material saved, and in the better cleaning obtained.

One mill tells us that, with three-quarters of a pound of OAKITE, they can clean their sieve cloths better than they formerly could with five to seven pounds of other materials. Furthermore, the cloths now come out looking like new, and feeling softer than ever before. Washing only takes 15 minutes, whereas formerly it required 45 minutes.

OAKITE brings similar advantages in cleaning felts, Fourdrinier wires, screen plates, dandy rolls and cylinders. Ask us to have one of our service men call and give you complete information. No obligation.

OAKITE IS MANUFACTURED ONLY BY

OAKITE PRODUCTS, INC., 16A Thames St., New York, N. Y.

(Formerly OAKLEY CHEMICAL CO.)

Oakite Service Men, cleaning specialists, are located at:

Albany, Allentown, Pa.; Altoona, Pa.; Atlanta, Ga.; Baltimore, *Birmingham, Ala.; *Boston, Bridgeport, *Brooklyn, Buffalo, Camden, Charlotte, N. C.; *Chicago, *Cincinnati, *Cleveland, *Columbus, Ohio; *Dallas, *Davenport, *Dayton, *Denver, *Des Moines, *Detroit, Erie, Pa.; Flint, Mich.; Fresno, Cal.; *Grand Rapids, Harrisburg, Hartford, *Indianapolis, *Jacksonville, Fla.; *Kansas City, *Los Angeles, Louisville, Ky.; *Milwaukee, *Minneapolis, *Montreal, Newark, Newburgh, N. Y.; New Haven, *New York, *Oakland, Calif.; *Omaha, Neb.; Philadelphia, *Pittsburgh, Portland, Me.; *Portland, Ore.; Providence, Reading, *Rochester, Rockford, Rock Island, *San Francisco, *Seattle, *St. Louis, South Bend, Ind.; Springfield, Ill.; Syracuse, *Toledo, *Toronto, *Tulsa, Okla.; Utica, *Vancouver, B. C.; Williamsport, Pa.; Worcester.

**Stocks of Oakite materials are carried in these cities.*

OAKITE

TRADE MARK REG. U.S. PAT. OFF.

Industrial Cleaning Materials and Methods

The dominant vacuum pump for paper mill service

Nothing more convincingly affirms the preference for Nash Hytor Vacuum Pumps for removing water and air from flat boxes, felts, wires, rolls and similar machinery than the few following facts—

Over 600 mills are Nash Hytor users. Of these, many are operating as many as 20 and 30 Nash Pumps. One large company alone is using 130 Hytors! Mills in which Nash equipment is installed make over 81% of the country's total production of paper!

We are proud of this record. It proves the unquestionable supremacy of Nash Pumps for paper and pulp mill service.

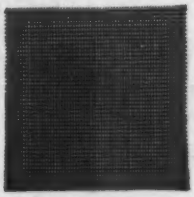
NASH ENGINEERING COMPANY
So. Norwalk Connecticut

New England Representative
Mr. G. H. Gleason, Nottingham Bldg., Boston, Mass.

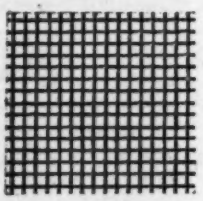
Western Representative
Mr. T. H. Savery, Jr., 80 E. Jackson Blvd., Chicago, Ill.

Nash Hytor
VACUUM PUMPS AND COMPRESSORS

FOURDRINIER WIRES



In Brass, Bronze and phosphor bronze, widths up to, and including 250 inches.



Also

CYLINDER FACES
WASHER WIRES
and CORDUROY CLOTH

THE
W. S. TYLER COMPANY
Cleveland, Ohio, U. S. A.

not propose to do more than to keep the Bracken government advised of developments and will do the deciding himself and accept the full responsibility.

There is a possibility that the controversy may be settled by the company dropping its application entirely for an additional 1,800 square miles of limits and asking the Government to guarantee it 6,000,000 cords of pulpwood to include the cordage already possessed by the company in pulpwood berth No. 1 and in the additional 1,080 square miles granted in 1925. Hon. Charles Stewart is said to regard the proposal very favorably, as the aerial patrols sent out during the last two years have proved the pulpwood resources of Manitoba to be so great that the Government now feels safe in guaranteeing a large cordage.

J. D. McArthur, prominent Western Canada contractor and railway builder, died recently in Winnipeg at the age of 73. A native of Glengarry County, Ont., Mr. McArthur resided in the west for over fifty years and carried out many important railway undertakings. He was widely known in pulp and paper circles, being a director of the Manitoba Paper Company of which he was one of the original promoters. During the last couple of months of his life he was busy at Ottawa trying to establish a paper mill at Prince George, B. C.

Marketable paper was made for the first time in the Manitoba Paper Co.'s mill at Pine Falls on the 17th of January. The plant is said to be meeting the expectations of the directors in every way and is gradually being worked up to its maximum output of 100 tons of news per day.

ALBERTA

Straw Paper Co., Floats Issue

The Straw Paper Company, Limited, of Canada, has floated an issue of $300,000 of 7 per cent cumulative preferred stock for the purpose of constructing a plant at Edmonton for the manufacture of paper from straw.

The undertaking is the outcome of investigations carried out by Dr. John Bache-Wiig for the Provincial Government with the co-operation of the Forest Products Laboratories at Montreal.

H. F. McKee, president of the company, recently stated that it was expected the Edmonton plant would be in operation some time this year, and that later on it was quite possible that other plants would be erected at strategic points throughout Alberta.

BRITISH COLUMBIA

Initial Dividend of B. C. Pulp and Paper

The British Columbia Pulp and Paper Company has declared a dividend of $8.75 per share on the company's 7 per cent cumulative preferred stock, payable February 1st to shareholders of record January 15th. This dividend is the initial one to be declared by the company and is for the fifteen months' period ending January 31st, 1927, representing all accumulated dividends on the stock.

Since the reorganization of the Whalen Pulp and Paper Mills into the British Columbia Pulp and Paper Company, good progress has been made in connection with building up the properties and extending the company's markets for bleached sulphite. Only two mills out of the three have been operating and this condition may continue indefinitely, as the third mill is not considered nearly as advantageous a producer as the other two. The Woodfibre and Port Alice mills are together producing about 200 tons daily, and an increase of 15 tons at each mill is being arranged. Experiments are being made on the bleached sulphite with the idea of making it suitable for rayon, such as is being produced at the Kipawa mill of the Canadian International Paper Co.

Export figures show that there has been an improvement

Dilts

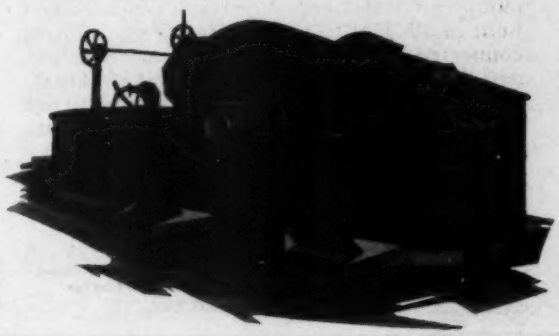
Performance!

of

Approved

NEW TYPE

Beating Engine



One User Reports:

"We have run several tests on the 66"x60" Beater, which you recently furnished us. We find it will carry 3,850 pounds actual dry weight and circulate at 17.4 feet per minute, consistency 9.57% on 80 to 85 horse power."

Another Writes:

"In the NEW TYPE beater recently installed we are carrying 50% more kraft beating the stock the same length of time and we do not believe we are using any more power than we are using in our Hollanders."

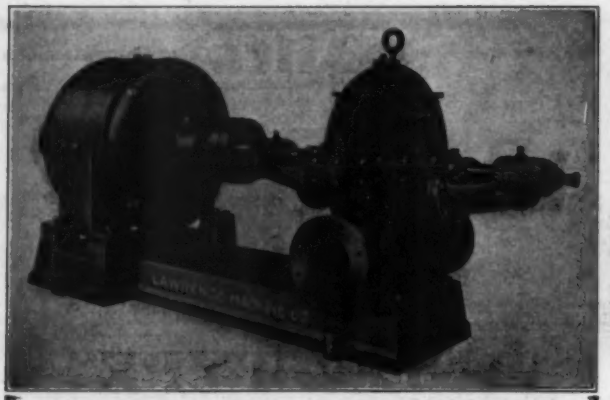
Write for details of this power saving common sense Beating Engine

"Your Paper is made in Your Beaters"

Dilts

MACHINE WORKS, Inc. FULTON, N.Y.

EXPORT OFFICE - 15 PARK ROW - NEW YORK CITY



LAWRENCE Centrifugal turbine pump, single stage, horizontally split casing, double suction enclosed impeller, high pressure pumps for water supply service, designed and built in all sizes to meet all conditions. Direct connected to electric motors, steam turbines, gasoline engines, etc. Material and workmanship of the highest class. Please submit to our engineering department your specifications. Prompt service rendered at all times.

LAWRENCE MACHINE COMPANY
LAWRENCE, MASS.
Manufacturer of "Lawrence" Pump, Centrifugal Pumping Machinery, Vertical Steam Engines, Contractors for Special Machinery

STANDARD SELF ALIGNING BELT FASTENERS

You can't go wrong on transmission or conveyor belts. Self Aligning hold the plate firm and square on the belt while rivets are being driven.

It is not necessary to use a rivet holder, nibs in the rivet hole align the rivet lengthwise of belt, the right way.

Self Aligning are rust proof and last indefinitely in wet or damp places, and you don't throw them away every time you take up a belt.

You need not turn your heavy wide belt over to clinch. Rivets may be clinched by driving against a block of metal on the under side of the belt.

Send for sample fastener for comparison with what you are now using. For 3 to 8 ply transmission to 5/16-in. thick conveyor belts.

THE BOURNE-FULLER COMPANY
UPSON WORKS
UNIONVILLE, CONN., U. S. A.

LOBDELL

IMPROVED MICROMETER ROLL CALIPER

Is indispensable to the mill equipped to regrind its own rolls and is equally useful in every mill in keeping an accurate check on the condition of the calender and press rolls.

Light Weight
Easily Adjusted
Extremely Accurate

LOBDELL CAR WHEEL COMPANY
Established 1836
WILMINGTON, DELAWARE.

in shipments of bleached sulphite to Japan, which is one of this company's largest customers.

The Provincial Government has authorized the sale of a billion feet of timber on Graham Island to the Powell River Co., of Powell River, which will use it in its pulp and paper mills, the rated capacity of which was recently increased to about 500 tons of news a day. This is the second of what is expected to be a series of large timber deals in the province, and follows the sale within the last six weeks of two large areas of timber at Campbell River to the International Timber Co., of Seattle and Portland. These two blocks of timber were sold at a total price of over $4,000,000. In the present instance the Government will feceive 75 cents per thousand feet for the spruce timber and 50 cents per thousand feet for all other woods in the limits.

Crown Willamette to Expand Into Canada

Negotiations were recently completed between Hon. T. D. Patullo, Minister of Lands at Victoria, and James H. Lawson, attorney for the Crown-Willamette paper interests of San Francisco, as a result of which the development, at a cost of some $15,000,000 within five years, of Campbell River Falls, on the east coast of Vancouver Island, will be immediately undertaken. The first unit will be a 200-ton paper mill, but power sufficient for eventually supplying a mill capable of manufacturing 1,000 tons of newsprint a day is said to be available.

The contemplated development will lead to establishment of a new town of 4,000 to 10,000 persons in the central region of the Island, it is stated.

The Canadian Crown Willamette Company, Limited has been incorporated at $5,000,000 as a subsidiary to the Crown Willamette Paper Company which is already operating four other paper mills on the Pacific Coast.

NEW BRUNSWICK

Bathurst Company's Expansion Program

At a recent meeting of the County Council held in Bathurst, a petition was presented by the Bathurst Co., setting forth that to carry out the proposed changes in connection with the company's paper mills some legislation would be necessary. Among these was authority to change the location of highways around the mills and the location of the bridge over the Nepisiquit River, damming the Nepisiquit River and a fixed assessment for a period of 30 years.

Angus McLean, president of the company, submitted blueprints showing the proposed mills, power plants and dams. He stated that the new newsprint mill would be in operation about 1930 and would employ 1,000 more hands than at present, involving an increase of about 5,000 in the population of Bathurst. The power developed would exceed 50,000 horse power and the estimate for storage basins and power plant was over $9,000,000, while the output of the mills would be increased to six times the present capacity, entailing an additional expenditure of about $5,000,000.

NOVA SCOTIA

The Moose River Lumber Co., located at Moose River, six miles from Parrsboro, was recently sold to the Lincoln Pulpwood Co., of Bangor, Me. The price was not announced. The area involved is about 15,000 acres, and it is stated that operations will be carried out on a large scale employing some 400 men.

Announcement has been made that the Penobscot Lumber Co., of Penobscot, Me., has purchased the 12,000-acre spruce areas of the Hill Brothers, of Colchester County, at a price of approximately $100,000.

The LENIX Drive

(Trade Mark Reg.)

Engine driving 150 k.v.a. alternator.
Driving pulley 12' dia. x 52" face, 104 r.p.m.
Driven pulley 25" dia. x 22" face, 600 r.p.m.
Horizontal center distance 10'0".
Belt 20" wide, double leather.

CROWDED ENGINE ROOM UNDERLOADED ENGINE

This was the situation facing a client considering the installation of a new generator, which simply had to go in. The full width of the main engine flywheel was occupied by one 30" main lineshaft belt and one 16" countershaft belt, running in opposite directions. With this arrangement the engine could only be loaded to two-thirds of its full capacity. The problem was to make the full capacity of the engine available in the limited space of the engine room.

The Lenix engineer recommended the installation of the new 150 KVA alternator in the space between the main engine and the countershaft. The new alternator belt was placed under the countershaft belt as shown, thus making the countershaft belt run on top of the alternator belt on the engine flywheel. This arrangement, incidentally, improved the efficiency of the countershaft drive.

This installation has been in satisfactory service for more than three years.

A number of Lenixes are still in daily service after nearly twenty years of operation. This is proof of the reliability and the soundness of design and construction of the Lenix. Our experience, the result of twenty-one years in designing and building Lenix Drives for installations ranging from 1 H.P. to 1400 H.P. is offered for the solution of your belt drive problems.

A card will bring you full information.

F. L. SMIDTH & CO., Inc.

Engineers

50 Church St., New York, N. Y.

THE MICHIGAN PIPE COMPANY

Manufacturers of

COMBINATION STEEL AND WOOD PIPE

Office and Factory: Bay City, Michigan

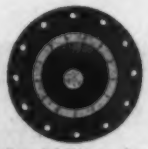
PRODUCTS:

Pipe for conveying—Pure Water, Acid Water, White Water, Sulphite Waste Water, Paper Stock, Ground Wood Pulp, Gases

SPECIAL FITTING FOR ACID WORK WRITE FOR CATALOG

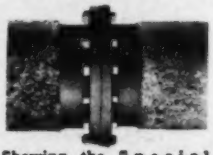
Michigan Pipe for Paper Mills

Liquid Conveyed Touches No Metal



Special Flange for Paper Mills.

ADVANTAGES:
Saves Power
No Discoloration
Lasting Qualities
Light in Weight
Cheaper.



Showing the Special Flange Joint, Light in Weight, Specially Desired for Inside Installations. Easy to Take Apart

SERVICE:
We maintain experts who will take entire charge of pipe installations if desired.

THE HOME OF STEEL SHELL BURRS
AND
YELLOW JACKET SHOWERS

All Products Guaranteed to Suit You

F. W. Roberts Manufacturing Company

Read the "ROBERTS IDEA"

Lockport, N. Y. Niagara Falls, Ont.

Wooden Tanks
for
Every Purpose

Stuff Chests—Frank Smith Paper Co., Middletown, Ohio

STUFF CHESTS, like those illustrated above, cylindrical chests, beater tubs, acid blow cases, alum tanks, etc., are a specialty with us. Let our engineers assist you in determining the type of construction and material best suited for your requirements. Our catalog containing a treatise on "The Effect of Chemical Solution on Different Tank Woods" is yours for the asking.

The Hauser-Stander Tank Co.
CINCINNATI, OHIO

1,000,000,000

In 38 years of design and manufacture of water filters and softeners, Hungerford & Terry have installed an aggregate daily capacity of more than one billion gallons.

This experience has enabled them to aid paper and other manufacturers to improve their products and reduce their costs of production by the proper treatment of that important material—water.

Is your water supply properly protected to insure highly efficient mill operation and the highest quality in your product? Hungerford & Terry Engineers will investigate your conditions and report to you fully without obligation.

HUNGERFORD & TERRY
INC.
CLAYTON, N. J.

PACIFIC COAST NEWS

The Columbia Pulp & Paper Co., of Salem, Oregon, according to information received late in January, has taken over the House Sound Pulp & Paper Co., with a plant near Vancouver, B. C. The deal involved approximately $1,000,000, according to reports. The Columbia Pulp and Paper Co. recently absorbed the Oregon Pulp and Paper Co. in Salem, the Columbia Pulp and Paper Co. at Vancouver, Washington and the California-Oregon Pulp and Paper Co. at Los Angeles, California.

On February first articles of incorporation were filed in Olympia, Washington, for the new Zellarbach Pulp & Paper mill, by J. C. Shaw, Grays Harbor representative of the Zellarbach company and John C. Hogan, corporation attorney. The new plant will be built on the site formerly occupied by the National mill in east Hoquiam, and will be known as the Grays Harbor Pulp Company. The organization is incorporated for $2,900,000, and the first unit of the plant will cost approximately $3,000,000, it is reported. The daily capacity will be 125 tons of wood pulp.

New Mill on Poplar Island

Following reorganization of the Canadian Rayon Pulp Company, Ltd., construction of a large pulp mill on Poplar Island, on the Fraser river near New Westminster, B. C., will begin immediately, the new management announces.

Purchase of the island for $35,000 from the Indian department will be completed. Machinery has been ordered and will arrive next month.

After investigation by A. R. Stuht, head of the Washington State Board of Health of complaints that the discharge of the unpurified chemical wastage from pulp mills into the waters of the upper Puget Sound would result in the destruction of the valuable Oyster beds, a conference has been called by Charles R. Maybury, director of fisheries of Washington for Friday evening, January 21 at Olympia. It is presumed that some action will be taken to require pulp mills to purify their aciduous wastage before dumping into sound waters.

It is believed as the result of inhaling gas fumes while working at the San Juan Pulp Manufacturing Company's mill at Bellingham, Wash., Robert W. Clark, 23, employed as a chemist, died January 15. A lungmotor and oxygen were used in an effort to revive him.

Propose Plant for Olympia

Subscription of more than $4,000 toward a goal of $20,000 by Olympia, Wash. interests to bring a $60,000 industry to Olympia was accomplished at a meeting of 30 business men at the Hotel Olympian recently. Earle McCroskey, president of the Chamber of Commerce outlined the project.

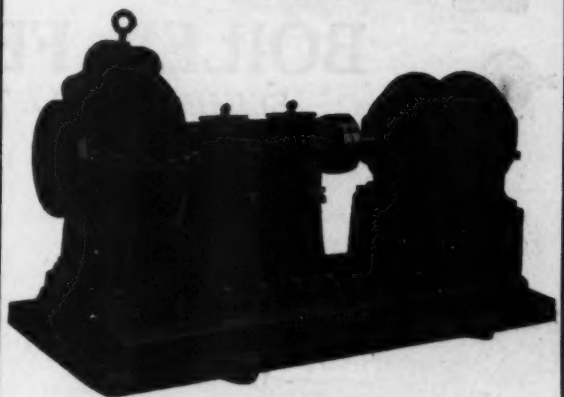
The proposed industry is a reclamation paper mill which will manufacture cheap toilet and tissue paper from old newspapers combined with sulphite pulp, and will involve a payroll of $75,000 to $100,000 per year if successfully established in Olympia.

A. D. Bowen of Seattle is the promoter of the plan and proposes to put in $40,000 if $20,000 can be obtained from local sources to finance the first unit. According to Bowen a tentative offer for the entire output of 8 to 12 tons daily has been received from a wholesale paper concern. With but one exception there is no other mill of the kind on the coast, Bowen declares. About three acres will be required for the plant, site of which has already been selected.

Officials of the Crown-Willamette Paper Company will return to Aberdeen shortly after the first of the month in an attempt to complete arrangements with the city for the location of a new pulp mill at that city.

W. D. Page, investment and loan agent of the Crocker National Bank of San Francisco, and V. Knight Sturges, pulp

Frederick
• Pumps •



Single-Suction Standard Paper Mill Stock Pump

Sooner or later, a paper mill turns to Frederick Pumps. For where pumping equipment is as important as in a paper mill, the pumps that meet the highest requirements of efficiency, dependability and durability are sure to be demanded eventually.

More Frederick Pumps were placed in service in 1926 than in any previous year of their manufacture. A great many of these were installed in plants where other Frederick Pumps were already being used. The sales record of Frederick Pumps for 1926 is an impressive testimonial that they are the leading pumps in the paper mill field.

There is a type of Frederick Pump suited to every need of the paper mill

The Frederick Iron & Steel Company
Frederick, Maryland

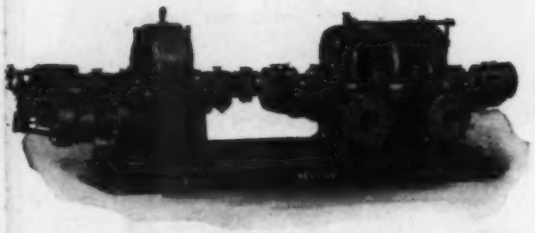
In Canada:
Dominion Engineering Works, Ltd., Lachine, Que.

MOORE

BOILER FEED PUMPS

"Best at every turn"

ELIMINATE ALL THRUST TROUBLES



Moore 3-stage double suction pump driven by Moore Steam Turbine

Moore Multistage Boiler Feed Pumps are built to meet present day high pressure specifications. Either the double or single suction style is used—depending upon the conditions to be met.

Perfect balance in the former is secured by the use of double suction impellers, while in the latter a simple hydraulic balance disk effects the same result.

Heavy or *complicated* external thrust bearings are not necessary. Moore Multistage Pumps are *self-balancing*. This very essential point merits *your* investigation.

Complete literature upon request.

Steam Turbines Centrifugal Pumps Reduction Gears

Offices in all principal cities

MOORE STEAM TURBINE CORPORATION

Wellsville, New York

In Canada Ontario and East—General Supply Co. of Canada, Ltd., Ottawa Manitoba and West—Darling Bros., Ltd., Montreal

A free passage for thick fluids

Fig. 297, flanged, Standard Iron Body Y or Blow-Off Valve.

A Jenkins Y Valve is in wide use in paper mills because of its advahtages for handling thick fluids. Designed with a flow practically in line with the pipe, it affords an unobstructed passage for the thickest, the grittiest of fluids.

The valve is fitted with Jenkins Renewable Disc and renewable seat ring. It is also a blow-off valve, and built to stand the severe strains of boiler service.

Obtainable, as are Jenkins Valves for practically every requirement, at supply houses everywhere.

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524 Atlantic Avenue .....Boston, Mass.
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JENKINS BROS., Limited
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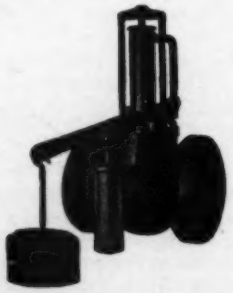
Always marked with the "Diamond"

Jenkins Valves

SINCE 1864

VALVE MAKERS FOR OVER FIFTY YEARS



WINTER is here, and in spite of everything, it's hard to keep the coal bill down. But a Davis pressure regulator will help. It takes steam at boiler pressure and delivers it at reduced pressure for heating plants and auxiliaries. And it's on the job, keeping the coal bill down all the time. It's built for continuous trouble-proof service.

The Davis Pressure Regulator is dependable because it is mechanically simple. Pressure balanced by weight—not by springs which may deteriorate. An oil dash pot gives steady service without chattering. And the lever makes its action visible—you can test it by hand.

DAVIS VALVE
STEAM SAVERS SINCE 1876
SPECIALTIES

G. M. DAVIS REGULATOR CO., 436 Milwaukee Avenue, Chicago, Ill.

P13—Grsf

and paper mill representative, were in Marshfield, Ore., the week of January 12 seeking a suitable location for a pulp and paper mill which will be constructed if an adequate site is found.

George T. Cameron seeks preliminary permit for a project on Crater and Long Lakes at Snettisham inlet, southeastern Alaska to produce from two to six hundred tons of newsprint daily.

The Fidalgo Pulp Manufacturing Company is building a frame, concrete and brick addition to cost $71,500 at its plant in Anacortes, Wash.

BRITISH CORRESPONDENCE

Present Trade Conditions

Printing paper exports from Great Britain to foreign markets showed a considerable increase during 1926; but some ground was lost in Australia mainly in newsprint and printings, owing chiefly to the increased interest taken in this market by Canada. Exports to some of the smaller British possessions overseas also declined. Restrictive measures in India, which have been applied for the benefit of native industry, make it increasingly difficult for us to keep a firm hold on our share of the paper trade in that country.

Although primarily an exporting country as far as manufactured paper is concerned, it cannot be denied that we have lost the supreme position which we once held. This, due in some considerable measure to the coal strike, is also traceable to a great extent to the terrifically heavy burdens of national and local taxation which industry is called upon to bear. A revival of home demands is at present the only event which is likely to reduce the present high costs of production.

Raw materials are available in fair abundance, but prices are a little harder than is usual for this time of the year. High shipping rates are another factor which has hindered export trade, but there is a tendency at the moment for them to go down.

In spite of the drawbacks and setbacks of the year which has just passed, there is, however, a spirit of optimism throughout the trade, which the present state of affairs would hardly appear to justify. It can only be accounted for by the fact that there are distinct hopes of a general trade revival, which must, of necessity, have its effect on the paper industry, for as trade improves, the demand for paper inevitably increases.

Wood-pulp prices are practically in the same position as they were in April last, prior to the commencement of the general strike. The increase of a farthing a pound on esparto prices will probably stand until March; but it is anticipated that as soon as orders show any tendency to slacken off, there will be an immediate return to old prices, especially as there are many firms outside the combine who make the definite fixing of prices an impossibility.

Applying the policy of standardization and concentration, with a view to the simplification of manufacture, one large firm of paper makers in the north of the country has ceased the production of esparto writings for stock, and is utilizing plant to the utmost capacity for the manufacture of more varieties of paper in smaller quantities. Wrapping-paper charges are still twenty shillings a ton in excess of those which obtained a year ago. The one-eighth of a penny per pound surcharge on woodfree section, which was imposed owing to the coal strike, is still in force, but is proving somewhat of a handicap to business development.

A future heavier consumption of fine papers seems to be indicated. It has been pointed out in trade circles recently that the term "fine papers" as applied in this country, is a rather loose one, for many makers include wood and esparto productions under this heading, although it should properly apply to commercial and stationery papers made from rag. Business for both the hand-made and machine-made mills is fairly quiet. A good American demand is, however, being experienced for genuine British hand-made paper, and an increasing

RYERSON

Immediate Shipment from Stock

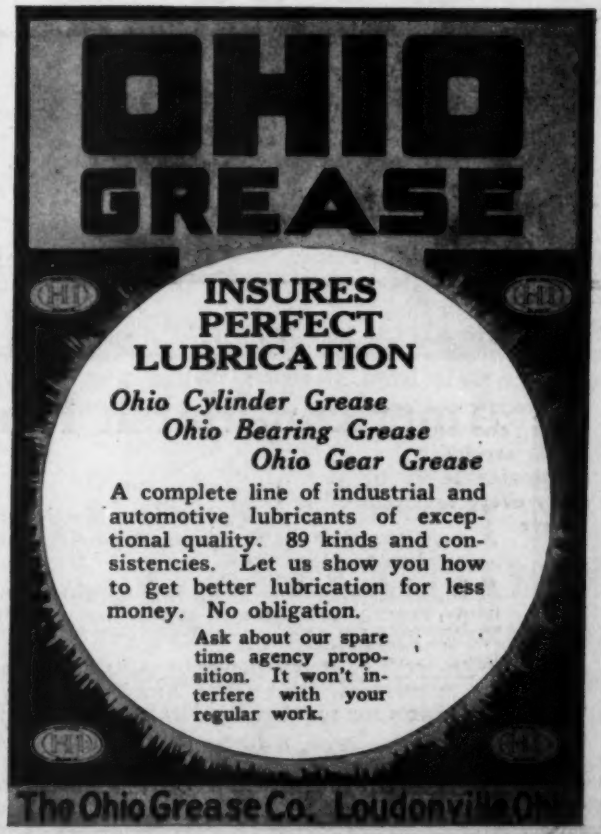
Bars, Shapes, Structurals, Rails, Plates, Sheets, Rivets, Bolts, Nails, Wire, Chain, Turnbuckles, Shafting, Boiler Tubes, Boiler Fittings, Corrugated Sheets, Concrete Reinforcing, Welding Rods, Babbitt Metal, Tool Steel, Bar Iron, Refined Iron, Floor Plates, Safety Treads, Small Tools, Machine Tools, etc.

Write for the Journal and Stock List—the "key" to Immediate Steel.

JOSEPH T. RYERSON & SON Inc.

Chicago Milwaukee Buffalo St. Louis New York Cincinnati Boston Detroit

STEEL


OHIO
GREASE
INSURES
PERFECT
LUBRICATION
Ohio Cylinder Grease
Ohio Bearing Grease
Ohio Gear Grease
A complete line of industrial and automotive lubricants of exceptional quality. 89 kinds and consistencies. Let us show you how to get better lubrication for less money. No obligation.
Ask about our spare time agency proposition. It won't interfere with your regular work.
The Ohio Grease Co. Loudonville, O

THE JOHNSON FRICTION CLUTCH

For paper-making machines JOHNSON Friction Clutches are unsurpassed. JOHNSONS start the machines smoothly and quickly, stop them instantly, or bring them to a gradual stop as desired.

Write for Catalog "P. I."

We have thousands of illustrated clutch reprints which tell all about our clutch installations. YOUR problem is quite sure to be among them. Get our data. Equip with JOHNSON Clutches.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

ECONOMIZERS

Foster Preheating and Superheating Surfaces for boilers and industrial processes steady the heating action, prevent overheating, and save fuel by increasing the heating efficiency.

AIR HEATERS

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The value of Foster Heat Engineering Service and Foster Construction are proven by more than 29 years of experience and over 11,000 installations in every industry and in every type of plant.

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INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL

A Type for Every Service

GOULDS PUMPS, Incorporated
SENECA FALLS, N. Y.

PUMPS

MAGIC BOILER PRESERVATIVE

"The Pioneer Boiler Treatment"

Positively removes and prevents scale, stops minor leaks, pitting and corrosion

GARRATT-CALLAHAN CO.
310 South Michigan Avenue, Chicago

148-156 Spear St.
San Francisco

MAGIC
ESTABLISHED 1904

1328 Broadway
New York City

American-Marsh Pumps Excel in Service

IN EVERY case where American-Marsh Pumps are installed they have proven dependable and economical to operate.

It is such service and performance that has caused many experienced users to standardize on American-Marsh pumps.

Whether it be steam, power or centrifugal pumps you are interested in, there is an American-Marsh exactly suited to your requirements.

Write for Bulletin

American Steam Pump Co., Battle Creek, Mich.

demand is being made at home for hand-made drawing paper, stationery cards, filter paper, special edition printing paper, banknotes, and other specialities.

Paper trade imports and exports for the month of December are shown by the following figures:

IMPORTS:

Values:

	Dec. 1926	Decrease on figures for Dec. 1925	Decrease on figures for Dec. 1924
Paper-making materials	£1,154,514	£106,963	£5,739
	Dec. 1926	Decrease on 1924	Increase on 1924
Paper and Cardboard.....	£1,370,583	£137,976	£98,092

Quantities:

	Dec. 1924	Dec. 1925	Dec. 1926
Wood pulp (tons).....	124,482	146,815	139,100
Paper (cwt.)	1,247,788	1,400,280	1,368,219

EXPORTS:

Values:

	Dec. 1926	Decrease on Dec. 1925	Decrease on Dec. 1924
Paper-making Materials	£89,751	£53,138	£101,989
Paper and Cardboard.....	£715,933	£136,210	£35,145

Quantities:

	Dec. 1924	Dec. 1925	Dec. 1926
Paper-making materials (tons)	16,254	14,081	10,793
Paper and Cardboard (cwts.)	384,087	434,970	299,281

Owing to the coal dispute, it has been almost impossible to judge the results of the wrapping paper duty. Imported foreign papers are stated to be £3 to £4 per ton higher in price than they were nine months ago. Makers of several varieties of imitation kraft types are reported to be more full up with orders than ever before, but it still remains to be seen how far British makers of best quality krafts will be able to cater for demands. The Merchandise Marks Act has now become law, but it is not certain how far it will affect the paper industry, for as far as this trade is concerned, the Act is permissive and not compulsory, and unless paper-makers or others think it will be for the general benefit of the country's trade that all imported paper should be marked either on itself or on the ream wrappings, with the country of origin, and make application before the proper authority with a view to getting action taken in this direction, it is presumed that it will remain unaffected.

In the event of the Act being applied to paper, there seems to be an element of doubt as to how far it will affect paper made and watermarked abroad to match exactly that produced in England, from a dandy-roll sent over by whole stationers or merchants in this country.

A correspondent of **The Manchester Guardian Commercial**, in a recent number, points out that in judging the results of the wrapping paper duty, it is not accurate to compare the 1925 and 1926 headings of "Packings and wrappings" as owing to the fact that "Greaseproofs and vegetable parchments" were included loosely under this category before the duty was imposed, and have now been given a heading of their own as they are free of duty, this has reduced the figure of "wrappings and packings" to a greater extent than it has actually been reduced by the imposition of the duty.

Newspapers Use Minimum Wood Supply

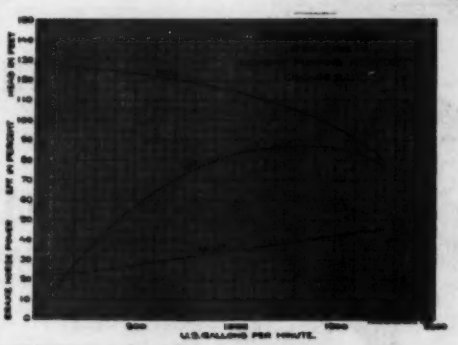
Douglas A. Crocker, forester of the Woodlands Section of the American Paper and Pulp Association, will present the facts on the small percentage of wood cut from America's forest land that goes into newsprint, in a study to be presented at the fiftieth annual convention to be held in New York City, February 21-24. His paper will also cover the problems of determining the future supply of wood for paper, pulp wood and other uses.

An increasingly large number of the large lumber and pulp and paper companies are pursuing a farsighted policy, looking toward the reforestation of their lands, the report shows. Forest fires and injudicious cutting by private owners, however, are making serious inroads into the available wood supply.

At the coming convention, three experts of the U. S. Forest Service, S. T. Dana, Director of the Northeastern Forest Ex-

Is Your Water Costing You Too Much?

Type M. J.



Performance Curve

This Type MJ at 1300 GPM and 105 foot head shows an unusually high efficiency—87%. Compare this saving made with the possibilities in your present pumping equipment.

It is if you are depending upon old pumps—pumps that have gone on for a number of years apparently giving you good service, then your water costs are too high.

Water costs more than it used to. You may be handling it in an expensive way and not know it. Why not check up with Economy Pumps—those water handlers that are "economical in first and final cost?"

We have made savings in Paper Mills that have run as high as 23%—a tremendous waste that was not known to exist until after the new Economy Pumps were installed.

Write for Bulletin 404 on Centrifugal Pumps and No. 403 on Vacuum Pumps. Let our Sales Service Department help you.

Economy
Pumping Machinery Co.
Centrifugal Pump Specialists
83 North Curtis Street Chicago, Illinois
Branch Offices in Principal Cities

Morey Paper Vulcan Mill Supply Co.

99 CHAUNCY St. BOSTON, MASS.

Sole Selling Agents

Brandon "TRI-UMPH" 3-Ply Dryer Felts

Up to 245" in Width

CAREFUL, INTELLIGENT, QUICK SERVICE

THE WATERBURY FELT CO.

SKANEATELES FALLS

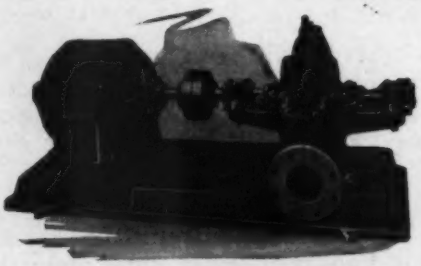
New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

"Chicago" Pumps



Here is a "Chicago" single stage horizontal pump. It is known as Type "D." Used for House, Booster, Circulating and Fire Duties. Designed to handle any kind of liquid or semi-liquid. Sizes up to 6". Capacities up to 2000 G.P.M. Heads up to 215 pounds. Ask for Bulletin 101.

Multi-stage Pumps for large capacities and high-pressures can also be furnished. Ask for Bulletin 103.

Literature Gladly Furnished Upon Request

CHICAGO PUMP COMPANY

SEWAGE-CONDENSATION-CIRCULATING
BILGE-FIRE-HOUSE-VACUUM

2318 WOLFRAM STREET CHICAGO, ILLINOIS

SPECIFY

Powell Valves

For Long Uninterrupted Service

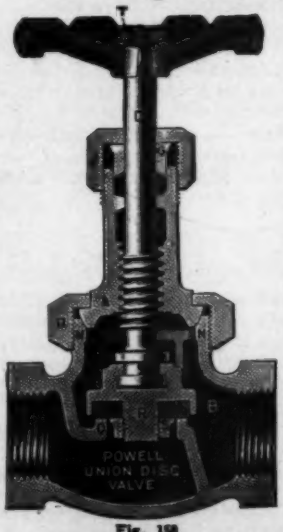


Fig. 150

Powell Composite Disc Valves

are furnished with bronze body and trimmings or iron body with bronze trimmings.

Bronze valves with union outlets are obtainable for both hot water and steam heating installations.

Discs are interchangeable with all standard vulcanized discs. However, we recommend Powell.

Descriptive circular on request.

THE WM. POWELL CO.

Dependable Engineering Appliances

2521-2531 Spring Grove Ave., Cincinnati, Ohio

periment Station; E. H. Frothingham, director of the Appalachian Station, and Raphael Zon, director of the Lake States Section, will discuss forest management with the paper manufacturers.

NORTHERN NEW YORK NEWS

Paper Mill Case Settled

Final settlement has been made in the $2,000,000 action of the McGraw Hill Corporation and the United Publishers Corporation against Stuart D. Lansing, the late Frank L. Moore, Virgil K. Kellogg, Jessie B. Kellogg, Carrie B. Lansing, Mabel Moore, Loren Bushnell, Florence H. Finnegan, Lottie Bushnell, Anna I. George, Harriet L. Bushnell, Madeline Bagley and the Jefferson County National bank as owners of the Newton Falls Paper Company prior to April 8, 1920.

The nature of the action which was brought July 10, 1924 by the New York publishing houses, who had purchased the property and business of the Newton Falls Paper Company over four years before, was to secure recession or cancellation of the contract to purchase. The plaintiffs alleged misrepresentation on the part of the defendants as to the value of the properties, alleging that the value was overestimated by $2,000,000.

For several months negotiations for settlement have been in progress, and signatures were affixed to the settlement papers late last month. While the parties to the transaction refuse to make public the actual terms of the settlement, it is understood that a substantial reduction in the price of the property sold soon after the close of the war when property values were at war time peak, has been made by the defendants and the plaintiffs will keep the property which they operate to supply paper for the various magazines which they publish.

Purchase of the property which included mills and water power on the Oswegatchie river at Newton Falls, 17,000 acres of timberland in the Cranberry Lake region, several thousand cords of pulpwood, and the hotel, stores and houses of the village of Newton Falls, necessitated the new owners spending a large sum of money in changing the mill over from a colored specialties mill to a book paper mill.

New Product at International

The International Paper Company's mill at South Glens Falls will in the next few months be transferred into a plant for the manufacture of fibrite and valdown, a synthetic cotton, giving employment to a large number of hands, mostly women and girls. Plans preparatory to starting the production of valdown are already under way. During the past few months, experiments in making valdown at the Bellows Falls mill have been carried on successfully.

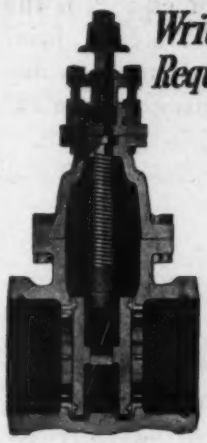
Machines for the manufacture of fibrite will be installed later. The International reached its decision to establish the business in South Glens Falls only a short time ago. Several other locations were under consideration, including New York City.

Valdown is used extensively in packing candy in boxes because of its moisture holding qualities. Fibrite will be shipped to various plants where it will be used in the manufacture of napkins and similar articles.

Production Records Broken

All production records for the last six years were broken in 1926 by the De Grasse Paper Co., at Pyrites. Four machines are employed at the plant and newsprint and wrapping paper are turned out. It is interesting to note that the newsprint production in 1926 was 20 per cent higher than in 1920, although no new machines were added. The wrapping paper mill almost doubled its production over that of 1922.

L. Lyle Wilson has resigned as manager of the Fort Edward and the South Glens Falls mills of the International Paper Company, where he has been associated for more than 25 years, and of late years he has been manager of the two



Write Down Your Requirements in a Gate Valve

COMPARE your notes with Darling's features. Then ask any user how near right you would be in equipping throughout with Darlings.

Constant action or long years of "sentry duty" are all the same to a Darling Valve. The reason? Simple, compact mechanism—no pockets to collect sand or dirt, compound equalizing wedges that are released at first turn of the stem to permit easy withdrawal of discs and rotating discs that seat in a new position at every operation—virtually self-cleaning.

Darling Gate Valves are establishing unusual records for long life, low upkeep, ease of operation and dependable service. And while Darlings seldom need attention, it is good to know that they are the easy valves to repair "on the spot."

DARLING VALVE & MFG. CO.
Williamsport, Pa.

New York
Chicago
Oklahoma City
Houston

DARLING
GATE VALVES

Pioneers in Paper Making

BELIEVING it will interest our friends to know something of the pioneer paper makers of America, brief notes of the earliest paper mills in different parts of the country will be recorded below from month to month.

Indiana's First Paper Mill

The pioneer paper mill of Indiana was not a successful adventure. It was erected in 1826 on the Big Creek, about twelve miles north of Madison, by Isaac Mooney, whose experience had been gained in paper mills on the little Miami River in Ohio. Within a year Mooney committed suicide, the mill was bought by Alfred McDaniels, who had a paper warehouse in Cincinnati. He only retained the property a short time and after its disposal it was converted into a grist mill.

Established 1842

Cheney Bigelow Wire Works

Experienced and Progressive

Fourdrinier and Cylinder Wires
Dandy Rolls and Cylinder Moulds
made and recovered

SPRINGFIELD, MASSACHUSETTS

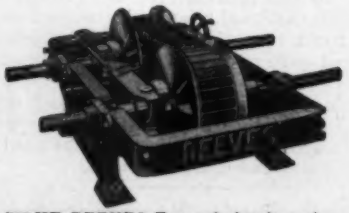
Photo shows a REEVES Transmission driving a paper cutter at the Southworth Company, Mittineague, Mass.

Accurate, Steady Gradations of Speeds!

THOUSANDS of paper manufacturers all over the world have eliminated waste in production by installing the REEVES Variable Speed Transmission and getting *accurate* speed control.

For instance, when a REEVES operates a paper cutter, the feed rolls run at a constant speed, and the speed of the knife is regulated to cut exactly the length of sheet desired. This simple, inexpensive device will run at any speed described between fastest and slowest so you can cut any length sheet at any time. Send for our catalog A-66 which gives full information.

REEVES PULLEY COMPANY
Established 1887
COLUMBUS, INDIANA



THE REEVES Transmission is a simple, compact mechanical device which receives power at a constant speed and delivers it at any speed desired to any machine or group. It will maintain one set speed indefinitely, or may be changed instantly to meet any different operating condition. Accurate and dependable, always.

REEVES
Variable Speed Transmission

mills. He will be succeeded at the Fort Edward mill by Richard Buckley, and it is understood that William Hoague who has been connected with the mill at Corinth for several years will be temporary manager at the South Glens Falls mill. Mr. Buckley has been employed by the International company for the last 23 years.

Merger Still Pending

According to reports in paper mill circles, here, the plans for the merger of the West End Paper Co., of Carthage; the Oswegatchie Paper Co., of Natural Dam.; the Diana Paper Co., of Harrisville, and possibly the Sherman Paper Co., of Watertown, have been completed.

While the announcement has not been made public, it is understood that J. V. Baron, vice-president and general manager of the Sherman mill, will become president of the new concern, and that J. H. O'Connell, head of the Diana Paper Co., will head the manufacturing end of the business. The West End mills and the Oswegatchie mills, headed by E. B. Sterling and S. B. Wardwell, are under the same ownership. Mr. Baron is also one of the principal owners of the Diana mill. Negotiations for the merger were carried on by bankers in New York earlier in the month and it was said that a large Canadian lumber company might be an influencing factor.

The consolidation would result in a corporation with a daily production of 175 tons of paper with a considerable range in grades, as well as valuable water powers.

One hundred members of the Ticonderoga chamber of commerce held a public meeting recently to discuss the situation relative to the proposed closing of the Ticonderoga plant of the International Paper Co. An effort is being made to have the mill continue in operation.

Bagley-Sewall Orders

A contract for the manufacture of a 136-inch fourdrinier paper machine for the Columbia River Paper Co., at Vancouver, Wash., has been given to the Bagley & Sewall Co. of Watertown, N. Y. Work on the machine has already been started and it is to be completed May 1. The Columbia River Paper Co. is manufacturing grease-proof paper and this is the second machine which the Bagley & Sewall Co. concern has sold it. The capacity of the machine will be 45 tons daily.

The Bagley & Sewall Co. has shipped a 136-inch paper making machine to the Oregon Pulp & Paper Co. at Salem, Ore. The machine is being assembled at the plant by Richard Gray. It is the fourth machine which the Bagley & Sewall Co. has made for the plant. The machine is for the manufacture of grease-proof paper. The machine was shipped in 35 freight cars to New York, from which point it was shipped by boat through the Panama Canal.

The Taggart Brothers, Inc., which is erecting a paper bag mill at Oswego, has let the contract for the construction of a machine to the Bagley & Sewall Co. The machine will be 164 inches wide and will be more than 300 feet long. It will have a capacity of from 65 to 70 tons every 24 hours. The plant is being laid out for two machines and it is expected that the capacity will be doubled.

Floyd Brockway, 24, of Malone, first assistant to the head electrician of the International Paper Co. plant at Piercefield, was instantly killed by coming in contact with a live wire at the plant.

The following officers have been elected by the Carthage Pulp and Board Co.: President, W. C. Rommel; vice-president, James Quinn; treasurer, F. S. Gorman; secretary, M. S. Fisher. J. R. Draper, for the last year general manager of the company, has resigned. Mr. Draper went to Carthage in 1925 to become manager of the company.

Paper currency scrapped at the United States treasury and then shipped to Beaver Falls and other places, has become the subject of judicial concern of the Interstate Commerce Commission, with the filing of a complaint by the Marquardt Hewitt Corporation of New York against freight rates now existing in shipments. The commission is asked to set reasonable rates. Once the discarded currency is scrapped by

Long Life---Strong Grip

THE belts on these Jordans were installed in a Pennsylvania paper mill in 1916. The larger one, a 24-inch three-ply Tannate Leather Belt is still running. The superintendent thinks this very unusual for a Jordan. Three or four years would be wonderful life for a rubber belt on this drive. Tannate gives you long life.

Another point often more important is their tenacious grip: especially on drives subject to overloads, or very irregular loads. Even when wet, it loses little of its pulling grip, as many beltings do. For power loss through slips usually means less output and sometimes irregular quality.

Have you tried Tannate? Many mills are finding it quite worth while. Always sold under the Rhoads Service Guarantee.

Use Rhoads Tannate Lace Leather
It outlasts rawhide three to five times

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PHILADELPHIA.....47 North Sixth Street
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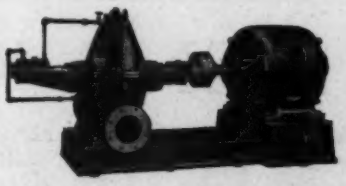

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We build the latest improved types for every pumping requirement in paper and pulp mills.

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Lawrence Pump & Engine Co.
P. O. Box 70B LAWRENCE, MASS.

80 YEARS'—

Experience in Making Dryer Felts

FITCHBURG Cotton Dryer Felts have conformed to the highest standards of quality and workmanship for over eighty years. This is one reason why today they are used so extensively.

¶ Manufactured in English weave, two, three, four, five and six ply, from 60 to 210 inches in width.

¶ Fine faced felts for fine papers. For coarse papers, use "Triune" three-ply Felts —**they're dependable.**

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ESTABLISHED 1844
54 Duck Mill Road FITCHBURG, MASS.

Exclusive Makers of
Paper Makers' Felts

Lockport Felts

HAVE YOU RUN THEM?
IF NOT—WHY NOT?

Are you interested in accurate running felts?

GIVE US A TRIAL
Get Authentic Information
Ask the men who run them

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LOCKPORT FELT COMPANY
NEWFANE, NEW YORK

Technical Association Papers, Series VIII (1925)

In paper, 248 pages. $3 per copy

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Chemistry in the Soda Pulp Process
Economy of Lime Reburning
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Strength Test for Chemical Pulp
Sulphite Waste Liquor as Fuel
Use of Decayed Wood for Bleached Chemical Pulp

MECHANICAL OPERATION
Alexander Electric Paper Drier
Burning of Wood Refuse
Meistown Motor and Its Use in Water Removal
Rothe' Steam Accumulator
Steam Prime Movers for Paper Mills
Ventilation of Paper Machine Rooms

MECHANICAL PULP
Norton's Segmental Pulpstone
Refiners for Groundwood Tailings

PAPER TESTING
Bureau of Standards and the Weller Brittleness Test
Extractor and Cleaner for Carbon Paper
Pulp Weight Factors for Microscopical Analysis
Relation of Paper Furnish to Paper Tests
Stains for Microscopical Analysis
Study of the Mullen Tester
Test for the Liquid Permeability of Paper
Tests at Various Relative Humidities
Use of the Glarimeter for Paper Finish

WASTE
Burning of Wood Refuse
Economy of Lime Reburning
Uses of Carbon Recovered from Black Ash
White Water and Stream Pollution
White Water Utilization Code

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RESILIENT RUBBER ROLLS

That are snappy but not soft
Are the kind to use for paper machines

Made By
STOWE & WOODWARD COMPANY
The Rubber Roll Makers NEWTON UPPER FALLS, MASS.

the treasury it is known simply as pulp. Other cities to which the pulp is sent are Newton, Mass., South Manchester, Conn., Troy, N. Y., Jersey City, N. J., and Oakmont, Pa.

Michael McManus, for 42 years an employee of the Knowlton Brothers Paper Co., and for several years superintendent of the plant, is dead at the age of 78.

Warren Heads Paris Firm

Frank W. Warren, formerly of Watertown, now a paper mill engineer in Paris, with headquarters at 2 Rue Edouard VII, has just completed the incorporation of his business under a capitalization of one million francs. The corporate name of the concern will be F. W. Warren & Co., Ltd.

Mr. Warren is a brother of J. J. Warren, president of the Harmon Paper Co. and the Warren Parchment Co. and vice-president of the St. Regis Paper Co. He learned paper making in the mills of this country about thirty years ago, and first went abroad in 1900, when he took a trip to Sweden to study pulp and paper making processes in that country. With the exception of three years, he has lived abroad since that time, and has acted in a consulting capacity for various mills in Europe and Asia.

A fire department is being organized at Newton Falls by the villagers and the Newton Falls Paper Co.

L. I. Andrews, superintendent of the Oswegatchie Paper Co. at Natural Dam for the last two years, has resigned. He has been succeeded by William LaMott, who has been associated with the Champion Paper Co. at Carthage. Mr. Andrews has been in ill health for several months and it was said that this is the reason for his resignation. Prior to going to the Oswegatchie plant he was superintendent of the Great Northern Paper Co. at Millinocket, Me.

Joseph E. Bickers, employed as manager of the Monteola wood mill at Glenfield, owned by the Dexter Sulphite Pulp and Paper Co., has resigned his position to accept one with I. T. Williams and Son, wood importers. Frank Coumbe of Glenfield, who has been assistant manager of the Glenfield mill, becomes manager.

William J. Argy, superintendent of the Black River mill of the St. Regis Paper Co., has accepted a similar position with the Harmon Paper Co. of Brownville. He has been connected with the St. Regis mills for the last nine years.

Clarence T. Wright, for the last 16 years manager of the Champion mill in West Carthage, has submitted his resignation. Mr. Wright has no definite plans in view but has several offers.

George W. Knowlton, president of Knowlton Brothers Co., has resigned as president of the Watertown National Bank. Mr. Knowlton was elected president of the bank in 1882 and served continuously until this year with the exception of three years. Mr. Knowlton has been elected chairman of the board in recognition of his long service.

Karl Schneider, for the past 13 years chief chemist at the mill of Knowlton Brothers, Inc., has gone to Kalamazoo, Mich., to become chief chemist of the Hawthorne Paper Company. Mr. Schneider is considered one of the best chemists in the paper business and has written a number of technical papers on the subject. Before coming to the Knowlton mill, he was associated with Kuttrof, Pickhardt company, manufacturers of dyestuffs.

The New York office of the United States Gutta Percha Paint Co. will move from its present quarters to the big new Graybar Building, just east of the Grand Central Terminal. The product of this company is "Barreled Sunlight," which is widely known in United States, Canada, and being distributed abroad. Incidentally, the new Graybar Building, that will house this company's new offices, is to be completed in April of this year, and will be the largest office building above ground in the world.

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Water Power Equipment

For Over Fifty Years

NEW MILL TYPE

Turbine Water Wheels and Accessory Equipment

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Canal Gates
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Rodney Hunt Machine Co.
38 Lake Street, Orange, Mass.

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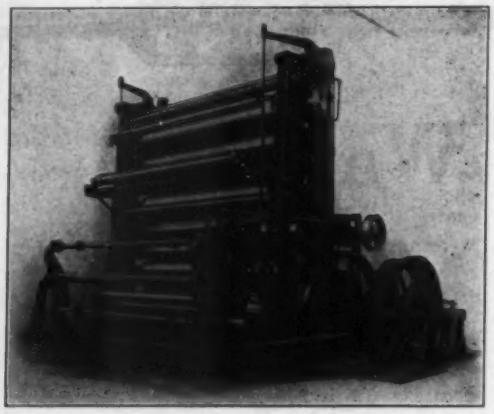
The Experience of 50 Years is of Value to You



Mr. Mill Superintendent:

You know that machines not in operation are a dead loss—that profitable paper making demands maximum operation of all equipment.

Probably you know, too, that for over thirty years an organization at Florence, Mass., has been pretty consistent in producing paper mill machinery that can be depended upon to stand the gaff—even when you push it along at full speed ahead for maximum production.

You are probably familiar with all of these dependable Norwood Paper Mill Machines—and have some of them in operation in your plant. But, there is a possibility that you haven't got all of the latest dope on all of these machines. So, we're just suggesting that you check up the list below and send the coupon back to us today.

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Please send full information about the Norwood equipment checked below, without obligation:
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are used with marked success in mills making the lines listed below. Your mill, no doubt, makes a product like, or similar to, some item in this list. If so, your mill could use Dayton High Speed equipment also—and profit materially by doing so.

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Book
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Comb. Board-Chip

Write for data on "Dayton" performance. You'll be surprised at what you learn.

We Rest Our Case on Performance

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NEW YORK CITY NEWS

Receivers for Maurice O'Meara Co.

Morris Gintzler, of the Pulp and Paper Trading Company, 21 East Fortieth street, New York, and Alfred C. Coxe, an attorney of 128 Broadway, New York, were appointed co-receivers in equity on January 27 for the Maurice O'Meara Company, paper and paper stock merchants of 450 Pearl street, New York, pending a possible re-organization of the company. Liabilities are estimated at about $250,000 and assets at about $400,000. The co-receivers were appointed under bond of $30,000.

The appointment of the co-receivers in equity was the outcome of two meetings of creditors of the company. At the first meeting a creditors' committee was named, with Mr. Gintzler as chairman, to investigate the financial affairs of the O'Meara Company and its future possibilities, and at the second meeting this committee reported to the creditors, and it was decided to ask for a receivership. On the creditors' committee besides Mr. Gintzler were Mr. Dorman, of the Champion Coated Paper Company; Mr. Northrup, of the Albemarle Paper Manufacturing Company; Mr. Begley, an attorney representing P. Garvan, Inc., and Robert O'Neil; Mr. Quinby, of the Allied Paper Mills; Mr. Faunco, of Price & Pierce, Ltd.; Mr. Brennan, of the North End Paper Company; Mr. Childs, of the H. Reeve Angel Company; Mr. Galewitz, of the Great Atlantic Paper Company, and Mr. Pleasants, an attorney representing E. J. Cole & Company.

The Maurice O'Meara Company is one of the oldest and best known concerns in the trade in the East. It was established in 1855, and thus is 72 years old.

At a meeting of the Board of Directors of the International Paper Company a few days ago Allan Curtis was elected first vice-president, Owen Shepherd, at present treasurer, was elected vice-president and treasurer, and A. A. White was elected vice-president and chief engineer. The directors also appointed Frank P. Lyden to be manager of the manufacturing department, and Charles S. Colson to be hydraulic engineer.

A petition in bankruptcy was filed on January 26 against the American Cordage and Paper Company, Inc., paper and twine jobbers of 37 West Nineteenth street, New York, by the Cupples Company on a claim of $7,000; Coy, Disbrow & Company, Inc., $300, and the Victoria Paper Mills Company, $191. Liabilities are estimated at about $50,000, and assets at about $10,000.

The J. J. Murphy Paper Company has moved from 102 Prince street to 225 West Thirty-fourth street, New York, where larger and more centrally located quarters are occupied.

Russell C. Tilden, for many years assistant sales manager of the International Paper Company and one of the best known paper salesmen in the metropolitan district, recently left the ranks of single blessedness to become a benedict. Before his marriage he was tendered a testimonial dinner at the Union League Club by his I. P. associates at which Joseph L. Fearing, sales manager of the company, acted as toastmaster. Mr. Tilden was presented with a set of silver.

The Old Masters Paper and Pulp Corporation, of New York City, has filed notice of an increase in capital from $20,000 to $50,000.

The Independent Paper Mills, manufacturers of paper products who moved recently from Brooklyn, N. Y., to Plattsburg, N. Y., have increased their capital stock from 5,000 to 30,000 shares, of which 10,000 are preferred, 10,000 Class A and 10,000 Class B, all of no par value.

The Arrowhead Mills, Inc., of Fulton, N. Y., manufacturers of roofing felt and wrapping paper, have announced that B. J. Quinn, formerly purchasing agent of the company, is now in charge of sales and will devote his entire time to this depart-

Starch

ECONOMY can never be mistaken for cheapness. In the matter of sizing material, starch is cheaper than an all-glue size, yet the results are identical—in fact, the paper made with starch sizing is stronger.

FOX HEAD NIAGARA
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Our experts can show you how these starches can be used advantageously in your mill. They will gladly call on request.

Corn Products Refining Company
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Starch

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A FIRST REQUISITE
IN
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Large Production
Ample Reserves
Prompt Deliveries
Purity 99½%

TEXAS GULF SULPHUR CO.
41 E. 42nd Street New York City
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Hood Systems and Heat Economizers, Heating, Ventilating, Air Conditioning and Vapor Absorption Equipment.

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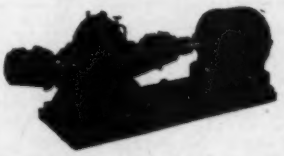
CENTRIFUGAL PUMPS FOR THE PAPER INDUSTRY



The Bethlehem Horizontal Centrifugal Pump is of the double-suction, single-stage type with horizontal split casings. Capacities 200 to 17,000 gallons per minute against heads of 20 to 250 feet.

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New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland

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PRESSURE PIPE THAT NEVER BURSTS
Built in sizes 1 inch to 48 inches

WYCKOFF WOOD PIPE

The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for White Water, Paper Stock, and Acids that can be obtained

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1855 Elmira, N. Y., U. S. A. 1927

"TWENTY TIMES FASTER THAN BY HAND"

For lifting paper rolls, removing calender rolls or raising Fourdrinier wires, use ROEPER Type "R" Electric Hoists—With or without Trolleys—Speeds up to 40 feet per minute—Send for Bulletins.

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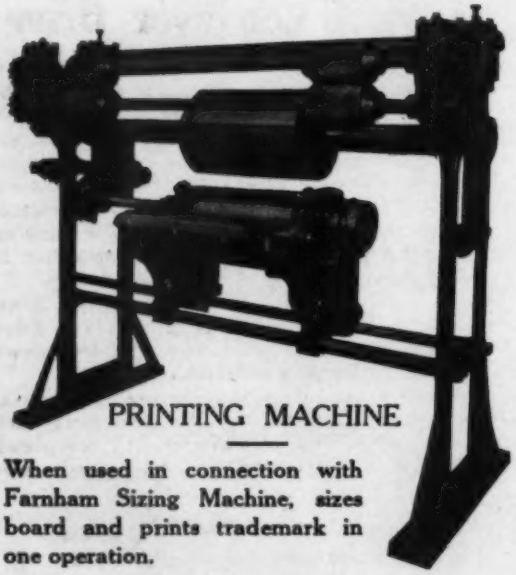
1724 North 10th Street READING, PA.

Wall Board Mill Machinery



PRINTING MACHINE

When used in connection with Farnham Sizing Machine, sizes board and prints trademark in one operation.

We Also Manufacture
A COMPLETE LINE OF SLITTING MACHINES
For Wall Board Mills

FARNHAM MFG. CO. Buffalo, N. Y.

1864 1927

"Excelsior" Felts

For EVERY GRADE of PULP & PAPER

We continue to maintain at the top the quality of Excelsior Felts, as we have done since we, as pioneers, made *the first endless paper machine felts manufactured in America.*

Seamless felts for fast running.
Satin Style felts for finish.
Special felts to meet every condition.
Send us your felt problems.

KNOX WOOLEN COMPANY
CAMDEN, MAINE

Sold by
BULKLEY, DUNTON & COMPANY
75-77 Duane Street, N. Y.
and direct

ment, continuing to make his headquarters in Fulton, N. Y. G. A. Keeney, Jr., of 100 East Forty-second street, New York, the metropolitan representative of the company, hereafter will be in charge of purchases, assisted by A. S. Page, who is in the main office in Fulton, N.Y.

Andrew Ragone, hitherto operating the Ragone Paper Stock Company, of 25 Broadway, New York, is now associated with Gaccione Bros. & Company, Inc., of 31 Peck Slip, New York, large packers and suppliers of raw material to paper mills. Mr. Ragone is one of the pioneers in the paper stock trade, having been affiliated with the waste paper and rag business for 27 years, and will devote his principal efforts with the Gaccione company to developing sales and taking care of the importing department of the firm.

David Galloway, formerly with William Hughes & Company, of New York, has organized the firm of David Galloway, Inc., with offices at 67 West Forty-fourth street, New York, to deal in papermakers' supplies, both foreign and domestic. Mr. Galloway was for 6 years with E. Butterworth & Co., Inc., 15 years with the Gatti-McQuade Company, and for the last 13 years with William Hughes & Company.

The Central Card and Paper Company, of 263 Grand street, New York, has been awarded articles of incorporation under New York State laws with a capital of $50,000. O. L. Ritt, J. Jacobs and L. Fenderman were the incorporators.

The Robert A. Cools Company, of New York City, has been incorporated under New York State laws with a capital of $25,000 to deal in paper. R. A. Cools, A. N. Lipfert and J. R. Lyon were the incorporators.

International Combustion Moves into New Quarters

The International Combustion Engineering Corporation announces its removal with its American subsidiaries—Combustion Engineering Corporation, Ladd Water Tube Boiler Co., Raymond Bros., and Impact Pulverizer Co., Inc., to the International Combustion Building, Madison avenue, corners 35th to 36th streets, New York City. It is an achievement of note, since it ranks as the sixth largest office building in the country, and its location at the crest of Murray Hills makes it a contributing mark to the skyline of New York's outstanding structures.

A half floor of the building will be devoted to a department under the direction of Dr. Wm. L. DeBaufre, one of the country's eminent scientists, who will devote his efforts to the perfection of an entirely new phase of power plant development. A large section of the building will also be used for the development of the McEwen-Runge process, which provides for the distillation of coal at low temperatures.

The establishment of this new center will be a drawing element for other engineering activities in the future, and will undoubtedly bring them in closer proximity than ever before, making Madison avenue the engineering center as well as the financial center.

Kalbfleisch Constructing New Plant at De Quincy, Louisiana

The Kalbfleisch Chemical Corporation announces that construction has started on a plant located at De Quincy, Louisiana. This, the seventh of the Kalbfleisch plants, will manufacture rosin size for the southern and western paper mills. It will begin production early in the spring, probably about April first.

The sales office for this territory will be Aubrey Bartlett, 777 La Salle Street, New Orleans, La.

Under the jurisdiction of the Lands and Forests Department of Quebec a forest research bureau has started to operate, with its headquarters in Quebec and controlled directly by the Forest Protection Service, which is headed by Gustave Piché, chief forestry engineer. The new bureau, which was created by statute some time ago, will look after the improvement of the forest and its conservation, based on experiments and researches made by experts of the bureau.

Illustration shows a Ganschow Type "B" driving a bucket conveyor.

The Ideal Conveyor Drive

SINCE the conveyor in all its forms is the heart of production, it is highly important that its drive be the best obtainable.

To be the best it must be impervious to acid, gas, abrasive dust, moisture, or other harmful conditions. It must be conservative of space, because space is always at a premium. It must be able to operate 24 hours a day, stand up under heavy and fluctuating loads, and be capable of delivering more than its rating promises.

The Ganschow Type "B" Angle Drive Speed Transformer meets all needs of a conveyor drive, and operates more efficiently and with less power than any other type of speed reduction.

Ganschow Speed Transformers are made in all types, sizes, and horsepowers, to meet every possible driving condition. Catalogue 111 completely sets forth the advantages of planetary speed reduction. Write for your copy.

William Ganschow Company
20 North Morgan Street Chicago

Plants: CHICAGO and PEORIA
Representatives in Principal Cities

Ganschow
SPEED TRANSFORMERS
CUT GEARS · FABROIL NOISELESS PINIONS

How Long Has Your Last Paint Lasted?

Was it three months or three years ago, or longer, when you last applied a coat of paint to your plant structures and equipment? How long has this paint lasted? How long *can* it last under the high temperatures, acid fumes and vapors found in a paper mill?

If you applied BITUMASTIC SOLUTION, we know that it has lasted longer than any other paint you have ever used. BITUMASTIC SOLUTION is specially compounded from a Bituminous base to withstand all paper mill conditions. Try it *next* time and note how your depreciation and repainting charges drop. Send for information or order a 5 gallon can or 30 gallon drum on trial, returning any unused portion if it does not satisfy in every way.

SINCE **BITUMASTIC** REG. U.S. PAT. OFF 1854

WAILES DOVE-HERMISTON CORPORATION
17 BATTERY PLACE, NEW YORK

322 S. Delaware Ave., Philadelphia **Union Trust Building, Cleveland**
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In Canada---Lytle Engineering Co., Montreal
Agents in principal cities

Longcrimp Fourdrinier Wires

USED EXTENSIVELY ON
Kraft, Wrapping and Newsprint Machines

Give Longer Average Service than the Regular Weave

Made By

The Lindsay Wire Weaving Company
(Collinwood Station) CLEVELAND, OHIO

See page 363 in the 1928 Paper and Pulp Mill Catalogue

NEW ENGLAND NEWS

Great Northern Split-up

Undoubtedly one of the outstanding features of the past month has been the Great Northern split-up in capital stock, by which the 250,000 shares of common par value $100 were increased to 1,000,000 shares par value $25. Prior to the split-up which was voted on January 24 the stock sold at $306 per share. During the past few years the company has paid $12 per share dividends and previously $10. Four years ago the company split up its stock by declaring a 200 per cent stock dividend which immensely benefited the stockholders because dividends were fixed on the new stock that meant a net increase in return. It remains to be seen what will be done at the next regular meeting of stockholders as to payment on the new shares. The company is still one of the outstanding newsprint producers of the world despite the tremendous growth of Canadian companies. It has no funded or mortgage debt and a substantial invested surplus and 1926 was one of the best years in its history.

The Great Northern Paper Co. today is producing one-fifth of all the newsprint paper made in the United States—in round numbers approximately 1,000 tons daily. The company owns its own pulpwood lands which include millions of acres and are all within the boundaries of the United States and mostly on the various headwaters of the Penobscot River. It owns its own talc deposits, produces much of its own power from hydro-electric developments, operates two railroads, steamships and has built and maintains 175 miles of highways through dense forests which are open to the public. Its famous Ripogenus dam stores 54 billion cubic feet of the Penobscot River and is one of the largest dams in the country. It carries on agricultural development in its territory, and has one of the most efficient forestry departments in the United States.

The company is at present rebuilding a big steel bridge over the Penobscot at Seboomook. It has just completed a railroad. The man at the helm is Garret Schenck, who founded the company some thirty years ago.

American Writing Paper Co. Reorganized

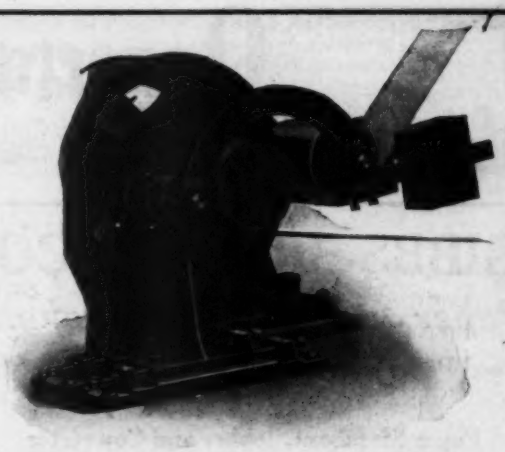
Receivership of the American Writing Paper Co. will be completely vacated on March 1st when the reorganized company takes the reins. Directors and officers have been elected as follows: Sidney L. Willson, president; Leon M. Yoerg and William L. Nixon were elected vice-presidents; L. S. Nold, treasurer; R. D. W. Ewing of New York, secretary; W. J. Norton and J. T. Wolohan, assistant secretaries, and Fred M. Clark assistant treasurer.

The newly elected vice-presidents are both general superintendents of the company. Both these men will continue to act in their former capacities. Mr. Yoerg has had a wide experience with the Carew Mfg. Co. and Hampshire Paper Co. and Mr. Nixon was with the Chemical Paper Mfg. Co. as well as with Moore & White, paper machinery builders.

The new board of directors includes George W. Davidson, president of the Central Union Trust Co., of New York; George C. Lee, of Lee Higginson Co., of Boston; Murray E. Coggeshal, of New York; Otto Marks, of New York; Henry K. Hyde, of the Ware Trust Co.; A. H. Larkin, and Frank S. Shaw.

The large mill of the International Paper Co., at Franklin, N. H., has been closed indefinitely and follows closely on the closing of one of the two I. P. mills at Turners Falls, Mass. It is said that some of the operatives at the Franklin, N. H., mill have been assured of employment at the huge new I. P. mill at Gatineau, Quebec.

Samuel Dennis Warren, until 1924 secretary of the S. D. Warren Co., died recently at his Boston home. He retired from the company founded by his family to take up a directorship of the Harvard Endowment Fund. He was born in Boston in 1885, educated at Harvard, and studied paper



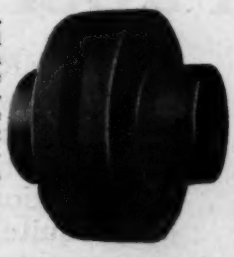
Another Way To Great Savings—
"We Have Just Ordered Another!"

Wherever the U. G. Belt Contactor is in use it lives up to its promises of economical performance. It eliminates the usually present difficulties experienced with longbelt drives along with the waste and wear and loss of power.

Read what the Union Mining Co., Mt. Savage, Md., says regarding this efficient little power transmission unit: "This drive is giving us such wonderfully good service that we have just placed an order with you for a second contactor, which we hope will work out as well as the one now in use."

Because its adaptability to many and varied industries has been proven, and because of the commendation of its users, we say the U. G. Short Center Belt Contactor will save for you, too,

POWER BELTS AND FLOOR SPACE



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NEW ENGLAND BRANCH
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Greenville, S.C.

Makers of Power Transmission Since 1857

GIBBS-BROWER CO.

Paper and Pulp Mill Brokers

Used Paper and Pulp Mill Machinery for the Mill

Paper Merchant, Jobber and Converter

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Sideline Men can make money selling our JIC liquid paste to paper bag manufacturers, paper products and paper converting companies. JIC paste is endorsed by the machine companies who make paper bag machines, and all these machines are tested out with JIC before being shipped from their factory. JIC is a big repeater. Write for samples, testimonials and terms. Address JIC DEPARTMENT, Jasmine Ink Corporation, Norfolk, Va.

WANTED—Boss machine tender in a mill in the middle west making Sulphites, Wrappings, Manilla, Bond and Book papers. Apply, stating age, weight, married or single, experience and references. Box 113, The Paper Industry.

FOR SALE—Second-hand 1200-lb. wood tub N. & W. beater. In good condition. Located in middle west. Address Box 115, The Paper Industry.

WANTED—Experienced Chief Draftsman to handle crew of thirty men designing building equipment. Apply Box 114, The Paper Industry.

WANTED—First-class machine tenders, back tenders and beater engineers in up-to-date roofing mill near Chicago, on felt stock cylinder machine—eight-hour shift. Permanent workers only need apply. Address Box 117, The Paper Industry.

POSITION WANTED—Pulp and Paper Chemist, Chemical Engineer, Paper Salesman. Four years' mill experience, six years' selling experience. Conscientious, reliable, honest. Desires position with reliable pulp and paper mill or paper house. Address Box 119, The Paper Industry.

FOR SALE—Larger capacity installation necessitates removal two beaters, first class shape. Roll 48" x 48"; ⅞" knives; iron tub; 800 lb. capacity. Will accept any reasonable offer. Bearings in excellent shape, as rolls are only a few years old. Address Box 120, The Paper Industry.

Two Wonderful Papermaking Propositions

THERE are two wonderful papermaking propositions ready to be developed in the South, which present opportunities to paper manufacturers who are desirous of expanding their present operations or going into new operations. These are two distinct propositions, and of quite different types. Each one of them, however, presents a much finer opportunity for big profits than anything that we have ever seen, and we have investigated many so-called exceptionally good papermaking propositions.

Any man or firm who has or can secure sufficient money can get information on these propositions, which are, we believe, the best opportunities in America for making money. Kindly address Box 118, c/o The Paper Industry, 356 Monadnock Bldg., Chicago, Illinois.

making in Europe for several years before returning to this country and taking up a position with the S. D. Warren Co., in 1910. He is survived by his widow and three children.

Although the paper merchants of Boston and New England generally postponed it until February 15th the date for making effective the new 1,000 count has been adopted by the mills in most cases throughout New England, February 1.

The Macco Manufacturing Co., of Willimansett, Mass., manufacturer of paper napkins, have been petitioned into bankruptcy with liabilities of $182,000 and assets of $68. Among the creditors are the Erving Paper Mills, tissue manufacturers of Erving, Mass.

Rags may be waging a losing battle with pulp for the fine papermakers' favor, but Holyoke is still using quite a few tons of rags in her paper output—100,000 tons annually or thereabouts being the reputed estimates for 1926.

Many improvements have recently been completed, and several others are about to be undertaken at the mills of Bird & Son, East Walpole, Mass. The electrification of their No. 1 beater room has been completed.

Nashua Gummed and Coated Paper Co. of Nashua, N. H., is suing the McLaurin Jones Co., with mills at Brookfield, Mass., for alleged infringement of patent covering an improvement in the manufacture of gummed paper strips. The invention owned by the Nashua Company was patented by B. L. Bundy of Nashua and sold to the paper company. In their response to the complaint, the defendant declares that the process described in the patent was not a new device, and was not entitled to patent protection, as it had been in use in several companies previously. The case is a suit in equity before the Federal District Court at Boston.

1,670,000,000 CUBIC FEET

NATIONAL FOREST TIMBER FOR SALE
EMBRACING TWO PULPWOOD PROJECTS IN ALASKA

Location and Amount—Each sale consists of all the merchantable timber marked or designated for cutting to an approximate total amount of $35,000,000 cubic feet of western hemlock, Sitka spruce, western red cedar, Alaska cedar and other species of timber, approximately 75 per cent hemlock and 20 per cent spruce, within the Tongass National Forest, Alaska. The lands to comprise the sale area or areas will be selected by the timber awardee of each sale subject to the approval of the District Forester, after the bids have been opened and the timber awarded and before the contract is executed and cutting is begun.

The lands to comprise one sale will be selected from within the exterior boundaries of Pulptimber Allotment "A" located in the general vicinity of the town of Juneau in the northern portion of southeastern Alaska. There is no western red cedar in this allotment.

The lands to comprise the other sale will be selected from within the exterior boundaries of Pulptimber Allotments "E" and "F" located in the general vicinity of the town of Ketchikan in the southern portion of Alaska.

Sale Conditions—The purchaser of each sale project must agree to establish a paper mill of not less than 200 tons daily capacity in the general region of the sale area before April 1, 1932. The time allowed for the cutting and removal of the timber from either sale extends to April 1, 1982. Timber is to be paid for in installments of $10,000 to $20,000 each as cutting proceeds. The unit of measurement for pulpwood is 100 cubic feet of solid wood. A prospectus and sample contract, including a statement of the procedure following award, may be obtained from the Forester, Washington, D. C.

Stumpage Prices—The bid rates will apply to timber cut prior to April 1, 1943. The lowest rates that will be considered are: For material to be used for pulp or its products, $0.60 per 100 cubic feet for Sitka spruce, western red cedar and Alaska cedar and $0.30 per 100 cubic feet for western hemlock and other species; for material sold by the purchaser or to be manufactured for sale in other forms than pulp or its products, $1.50 per M feet B.M. for sawlogs of spruce, western red cedar and Alaska cedar; $1.00 per M feet B. M. for sawlogs of hemlock and other species; 1½ cents per linear foot for piling and poles over 95 feet long; and 1 cent per linear foot for piling and poles 95 feet or less in length. Rates to be adjusted by the Forester on April 1, 1942, and at five-year intervals thereafter, under the conditions and limitations stated in the sample contract.

Relation to Water Powers—It is expected that bidders for either sale project will previously have submitted applications to the Federal Power Commission for permit covering water power development for manufacturing pulp and paper from the pulpwood hereby offered for sale. Each sale project is considered tributary to the water power sites in the same locality and the power permit will be granted to the timber awardee provided he meets the requirements of the Federal Power Commission.

Considerations Affecting Timber Award—In awarding each sale consideration will be given to the rates bid, financial ability to develop the paper manufacturing plant required, and any other factors which may assist in determining the bidder best qualified to make a success of the enterprise and whose project would be to the best public interest. The right to reject any and all bids is reserved.

Deposit—With bid on each sale project, $25,000, to be credited to stumpage payments, refunded or 20 per cent retained, as liquidated damages, according to conditions of sale.

Showing of Financial Ability—Each bid must be accompanied by a statement of the assets of the bidder available for this project, of the plan of financial organization proposed, and of any definite assurances of financial participation in the enterprise received from parties known to be able to make them good. Such a showing must include sufficient assets in hand to enable the bidder to meet the requirements of the water power permit applied for and to make the necessary investigation of the timber during the period of the conditional award. It must also indicate that the men identified with the organization and management of the enterprise have good business standing for responsibility, experience and capacity in the direction of business affairs.

Final Date for Bids—Sealed bids will be received by the Forester, Forest Service, Washington, D. C., for the sale in Pulptimber Allotment "A" up to 2 P. M., April 25, 1927, and for the sale in Pulptimber Allotments "E" and "F" up to 2 P. M., April 15, 1927. An extension of time of not to exceed three months for receiving bids for either sale will be granted at the request of responsible parties having legitimate interest to afford more time for field examinations. Before bids are submitted, full information concerning the character of the timber, conditions of sale, deposits and the submission of bids should be obtained from the District Forester, Juneau, Alaska, or the Forester, Washington, D. C.

FOR SALE
Used D. C. Motors from 2 to 40 h.p.
Used Large Steel Pulleys
Good Condition
THE LOGAN-LONG COMPANY
(Paper Mill) FRANKLIN, OHIO

Paper Mill Wire Cloth
Wisconsin Wire Works
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PAPER MACHINES FOR SALE
In good condition **Immediate Delivery**

One—2-cylinder machine. 2 presses; 10 dryers, 42″x84″; one calender; reel; single drum winder; marshall drive.

One Fourdrinier machine. Wire 96″x50′. 2 presses; 15 dryers, 48″x94″; one calender; reel; two drum winder; marshall drive.

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175 Richdale Avenue, Cambridge, Mass.

Lost and Found

LOST
Italian leather, containing purse, eye-glasses, cards, money, Lane Bryant's; Wednesday; keep money. Mrs. Thomas, Wisconsin 4120; reward.
$8,341,160.00—A comparatively recent survey indicated that approximately 414,120 tons of paper valued at the above figure is lost yearly by the mills of the United States and Canada in their mill effluents.
AG, containing telephone number Coney Island 2603, &c. Please return, Angelina Apidols, 2,352 Pitkin Ave., Brooklyn. Lackawanna 0252.
RTIFICATE for 5 shares of United States ubber Company common No. A190069, in e of Daniel J. Tierney, lost; all persons tioned against purchasing, negotiating or ing loans against this certificate; transfer ed. National Surety Company, 4 Al- St.
M—100-foot reel Cine Kodak film, near East 86th St.; missing one month; re-
FOUND
SAMPLE CASE, leather, marked G. E. N., in taxicab between Times Square Hotel and Lexington Av. Return to Stanley E. Gunnison, Inc., 67 West 44th St.
BOOK, envelopes, pocketbooks, parcels, keys, currency, fountain pen, flashlight and Thermos. Apply 3d Ave. Railway System, 130th st. and 3d av
INFORMATION which will lead to the prevention of 90 to 98% of paper mill loss in future years. The American Continuous Filter is already recovering part of it. It can recover your share and perform other duties at the same time. Write any of our offices for further data.
CAMERA STAND in golf bag on Chambers st. subway station, 7th av line. J. Cody, 844 Madison st.
WATCH, lady's wrist. Greenwich Village section - Phone VIRginia 2291.
DOG—Female fox terrier, white, with brown markings. Phone Lenox 3663
PURSE—Found in Yellow Taxi Saturday night. Phone Billings 3351
containing small sum.
HAZELTON, PA.—February 1st. United Filters Corporation report that their pulp type American Continuous Filter is having remarkable success in recovering fibers from paper mill effluents. They also report that these filters are materially aiding in better regulation of consistency control. According to statistics often as much as 7% of the incoming logs goes down the stream as mill loss. American Filters are installed as save-alls, deckers and save alls
thickeners combined

SOMETHING like 40,000 square feet of filter surface carried by American Filters have already been claimed from our "found" department by leading pulp and paper mills of the States and Canada.

Considerable filter area is still awaiting claimants. Some of this evidently could be used for deckering; some as save-alls; some as bleachwasher, deckers and save-alls; some as combined deckers and save-alls.

Our engineers will be glad to furnish descriptions of and complete information on these American Filters.

UNITED
AMERICAN
SWEETLAND
KELLY
FILTERS

UNITED FILTERS CORPORATION

Main Office and Laboratory—Hazleton, Pennsylvania

New York Chicago Salt Lake City Los Angeles

Export Office—25 Broadway, New York City Code Address—Unifilter, New York

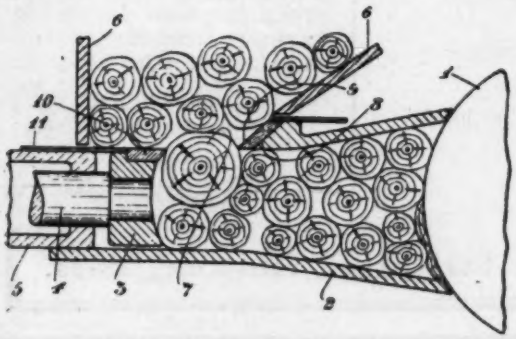
Technical Developments in the Paper Industry

Domestic and Foreign

The following abstracts are of the latest developments found in the foreign press and the domestic and foreign patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

Wood Grinder

IN THE ordinary types of grinders, in which the wood is introduced from the top or from the side through an inlet opening into the box or the magazine, it can very easily happen that a piece of wood would become wedged between the pressure plates and one end of the inlet opening. This results in the stopping of the pressure piston and the forward



movement of the wood ceases. Naturally the machine must be stopped, the wood removed, which entails considerable loss in time, power and production.

The invention which is patented in German Patent, No. 435,934, does away with this difficulty. As can be seen from the figure, the wood in the magazine (2) is pressed against the grindstone (1) by the pressure plate (3). The latter is fastened to the pitson rod (4) of a piston which is moved in a cylinder (5) and by means of some compressed fluids. On the return of the pressure plate (3) the wood falls down from an inclined plane (6) through the opening (7) into the magazine. It can easily happen here that a larger or smaller piece of wood can lie over the edge of the opening, so that when the piston moves forward this piece of wood would be jammed between the pressure plate and the edge of the magazine. The piston would then be stopped moving and grinding would cease.

In order to avoid this the edge (8) of the opening (7) which comes in contact with the forward moving wood is provided with a knife or a cutter (9), which, as the press plate (3) moves forward, cuts off the part of the wooden log which sticks above the edge of the opening (7). Then the rest of the wooden log moves along into the magazine and finally reaches the grindstone (1).

The pressure plate (3) can likewise be provided with a knife or a cutter (10), which acts along with the knife (9), cutting off splinters of the log so that it does not stick in the opening to the magazine. An apron (11) is provided as well on the pressure plate (3) for the purpose of preventing pieces of wood from falling behind the pressure plate when it moves forward.

Parchment Paper and Vulcanized Fiber

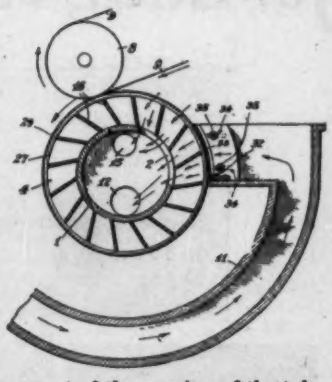
IN THE manufacture of parchmentized or vulcanized fiber by hydrolyzing cellulose fiber such as paper with zinc chloride or other suitable salt or acid, the last traces of the reagent are neutralized, and the corrosive tendency of the product overcome by the use of a medium or media which, while not injuriously affecting the treated cellulose material will form with the remaining hydrolyzing agent an insoluble product, or an addition product, and thus render lengthy washing after parchmentizing unnecessary. These media may be added to the hydrolyzing liquid or that may be applied before or after treatment therewith.

Where zinc chloride is the hydrolyzing agent use, the following media may be employed:—a solution of an alkali or of a salt of silicic or phosphoric acid or of sulphuric acid such as naphthalene sulphonic acid, an oleate, resinate, salt of casein or pyridine, an albuminate, an amine or other organic base, a solution of a salt which will give an insoluble chloride such as lead acetate, or silver nitrate, an oil such as tung oil used alone or dissolved in acetone or like solvent, such material, as also soft soap, rendering the product flexible and waterproof.

The use of an alkaline silicate such as sodium silicate yields a fireproof product. When zinc chloride is used, alkaline soap and some oils produce on the surface a coating of a very sticky zinc soap and may be used when it is desired to combine several sheets to form a solid plate or block under heat and pressure. Chinese wood oil produces a rubber-like surface which needs to be treated with an oxizing agent such as dilute chromic acid or a solution of iron chloride in acetone. Rubber latex or a drying oil such as tung oil may be applied to the cellulose material before hydrolysis. Dyes may be added to the neutralizing agent or the product may be passed subsequently through a separate dye solution British Patent, No. 260,374.

Making Paper

THE illustration shows a part of a papermaking machine of the cylinder type which is patented in United States Patent, No. 1,589,120. The machine consists of a rotating cylinder mold which is seen at (4) and in contact with which there is the couch roll (8). A stationary tube is provided within the cylinder which has an opening in its upper surface terminating short of the point at which a line drawn between the center of the couch roll and the stationary tube intersects the circumference of the tube. Vanes extending inwardly from the forming surface of the mold form partitions. Means are provided for supplying liquid stock to the forming surface of the mold adjacent to the lower part of the opening of the tube. There is also a vat which contains the liquid stock to which supply means are connected, a connection between the lower part of the stationary tube and the vat and an air exhaust pipe connected to the upper part of this tube.



Swelling of Sulphite Cellulose in Sodium and Potassium Hydroxides

A TECHNICAL method for the comparison of the swelling of various alkaline solutions on cellulose is described in Cellulosechemie, 1926, volume 7, pages 153-155. The cellulose, one gram, in paper form is immersed in one hundred parts of the solution at a constant temperature for a period of one and one half hours, after which it is allowed to drain to constant weight. The increase in weight is taken as a measure of the degree of swelling, although the amount of liquor retained by

1873 *On Their Second Half-Century of Service to the Paper Trade* 1927

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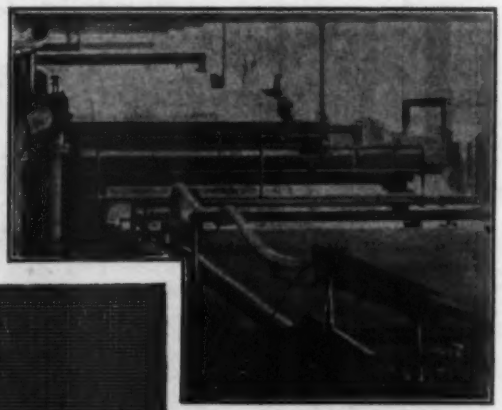


CABBLE Superior Fourdrinier Wires, because of their toughness and strength, give longer and better service in short or long runs, at either high or low speeds.

Over three-quarters of a century making wire products for the paper industry, has taught us how to make Superior Fourdrinier Wires of a smooth, even mesh that will not groove the suction boxes.

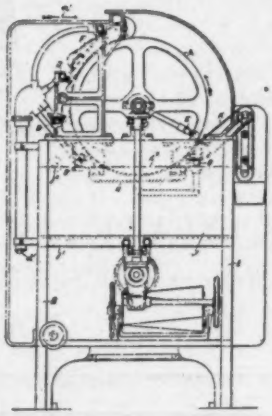
Cabble Superior Fourdrinier Wires are made of phosphor bronze or brass in all lengths, widths and meshes. The seams are made to your requirements. Standard mesh, phosphor bronze or brass wire cloth bearing the "Superior" trade mark will also be found of the highest quality.

The WM. CABBLE
EXCELSIOR WIRE MFG. CO.
80-88 AINSLIE ST. BROOKLYN

the fiber under these conditions is also dependent to some extent on the surface tension and viscosity of the solution.

According to the results of this method, sodium hydroxide at a temperature of zero degrees C and at 20 degrees C has a much greater effect on sulphite cellulose than has potassium hydroxide, and is more effective at a concentration of ten percent by weight at both temperatures. A solution of this concentration also has the greatest solvent action on sulphite cellulose. The swelling action of potassium hydroxide at zero degree C increases with increasing concentration until a 16.8 percent solution is reached, after which it remains approximately constant. At a temperature of 20 degrees C there appear to be two stages in the process. The degree of swelling increases as the concentration of potassium hydroxide rises to 5.6 percent, remains constant between 5.6 and 14 percent, then increases again to a maximum at a concentration of 28 percent. The viscosities of both sodium and potassium hydroxide solutions increase continuously with increasing concentration and it is therefore unlikely that the results are appreciably influenced by this factor.

Washing Sheets of Paper



THE illustration which accompanies shows a machine for washing paper and consists of a wash tank, an endless traveling support for the paper projecting into the tank, a series of stationary spray devices arranged outside the support and operated to hold the paper against it. A stationary spray device is arranged inside the support and operates to remove the paper from it at a predetermined point of its travel. United States Patent, No. 1,589,007.

Chemical Properties of Wood Cut in Spring and Fall and Its Value for Sulphite Pulp

THE author repeated the experiments made by Kinnmann and substantiated them to the effect that the fall wood has a higher specified weight and a higher cellulose value and concluded therefrom that fall wood is more valuable for the manufacture of chemical pulp than wood cut earlier in the year. The bisulphite bromine method, used by Kinnmann, for the determination of the cellulose value of the wood is however not entirely free from objection, so that the results obtained with it must be viewed with a certain amount of uncertainty. The author actually made cooking tests which gave more practical figures on the pulp yields of the woods. The first tests were made to compare the various properties of the pulp as well as the yield obtained from wood cut in the fall and in the early part of the year and are shown in the accompanying tabulation:—

	Wood cut in early part of Year	Wood cut in Fall
Water content in percentage on moist wood	10.41	10.39
In percentage on dry wood:		
Ash content	0.33	0.29
Ether extract	0.76	0.62
Lignin content	28.45	28.45
Methoxyl	4.66	4.92
Pentosan	7.58	6.77

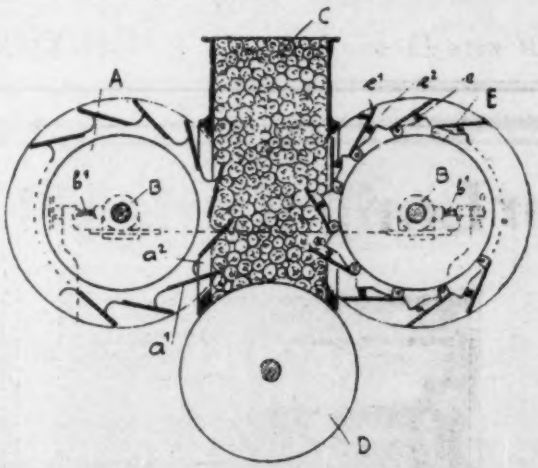
It is seen that aside from the pentosan content the wood is exactly the same in both cases.

The digestion tests were made with thirty grams considered as dry wood and 150 cubic centimeters of digestion liquor. The rise in temperature was regulated in the ordinary manner and the maximum temperature was 136 degrees C. Three digestion tests with three different concentrations of liquor were carried out.

The results of these tests showed that both the wood cut in the early part of the year and that cut in the Fall were decomposed with the same degree of rapidity, but the degree of disintegration is dependant in a certain sense on the manner in which the digestion is carried out. When the digestion is carried out with a digestion liquor that has a low hydrogen ion concentration the difference between the yields of pulp is considerably more marked. Thus it is found that the wood which is out in the early part of the year gives approximately two percent greater yield of wood pulp. The author notes this difference and calls attention to the fact that digestion with lime rich liquors also produces better results in the case of easy bleaching pulp. The wood cut in the early portion of the year also yields waste liquors with a lower sugar content than Fall wood although the difference is also small in this case. The Fall cut wood yields more carboxylic acids, that is acetic and formic acids, than the wood cut in the early part of the year. As far as the pulp made from the wood is concerned, it appears that the percentages of pentosans, lignin and ash in the products obtained from the two kinds of wood are about equal. The mechanical properties of the pulp are however quite different. The wood which is cut in the early part of the year gives the stronger fiber and hence the stronger paper, but the fiber is more brittle, as can be seen from the folding test. The tearing length and the elongation are properties that are in close relation with one another. Papers och Traevarutidskrift, foer Finland, Number 20, 1926.

Feeding Arrangement for Continuous Grinder

THE illustration shows a feeding arrangement for a continuous or magazine grinder as patented in Addition No. 30,712 to French Patent, No. 588,581. The two wheels (A) and (E) at either side of the wood magazine are provided with gripping devices which attach themselves to the wood and feed it to the grindstone. The press plates (a) of the pressure wheel (A) are arranged almost in a tangential manner. Acute angled hollow spaces (a^2) are arranged between the press plates. After a press plate (a^1) has penetrated into the opening of the wood magazine (C,) this hollow space is filled with wooden logs. On further rotation of the wheels the press plate approaches the horizontal position and then exerts a strong pressure on the wood that is being ground, which is located just under this device. The wood is pressed against the grindstone (D) in this manner. The press plate (A^1) moves away from the wooden log in the neighborhood of the grindstone and the wood log which was in the hollow space (a^2) is then held back by the walls of the pressure box.



Purifying Alkaline Liquors Contaminated with Cellulose Products

IT HAS been found that the liquors, contaminated with cellulose degradation products, such as for example that are obtained from the manufacture of viscose silk, can be generated and purified so that they can be used again by being treated with sodium hypochlorite at ordinary temperatures in the presence of a catalyst, such as copper, iron, lead and the like. The liquor is agitated by means of air and thor-

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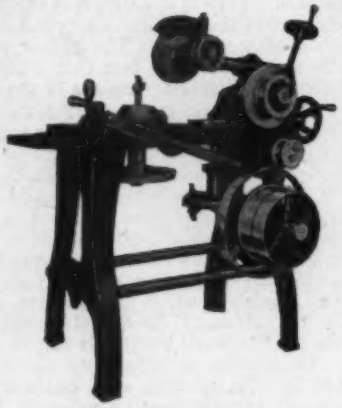

THE STANDARD
Capacity—8½-inch Diam. Slitters

Specifications: Floor space, 27"x 42"; speed of spindle, 55 revolutions; driving pulley, 9"x2½"—speed, 400 revolutions; emery wheel, 7"x¾"—speed, 3,000 revolutions; weight, about 425 lbs.

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For Greater Capacity

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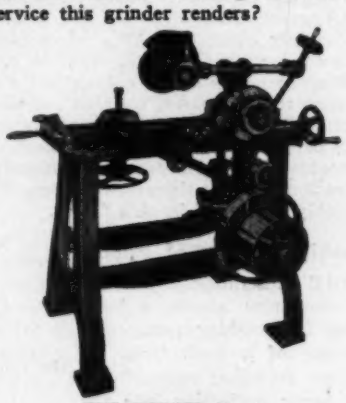
Here are the specifications: Floor space, 32"x52"; speed of spindle, 55 revolutions; driving pulley, 10"x2½"—speed, 400 revolutions; emery wheel, 8"x¾"—speed, 3,000 revolutions; weight, about 525 lbs.



THE KOEGEL No. 4
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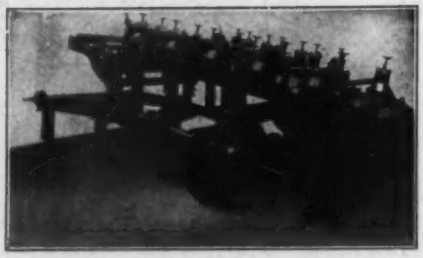

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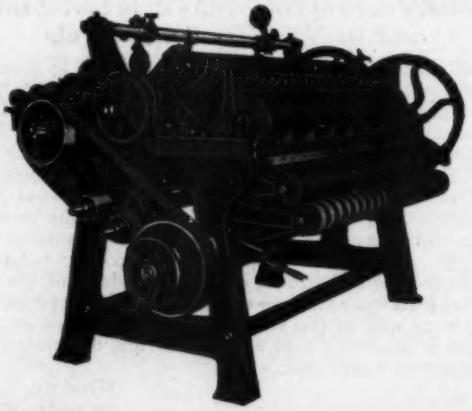

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CUTTER KNIVES
PATENT TOP SLITTERS

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oughly stirred up. The activity of the hypochlorite was less anticipated, for it is known that the hypochlorous salts are immediately decomposed in the presence of copper or copper compounds. In the place of using the finished hypochlorite, it can also be formed in any suitable manner during the course of the purification process in the liquor itself.

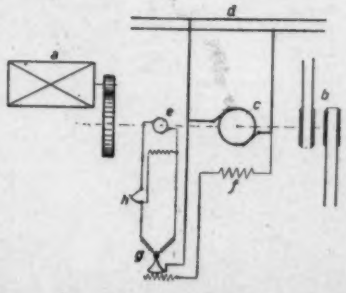
In contradistinction to the known method of working, that is to purify liquors which are contaminated with organic compounds, which method consists in the use of pressure and high temperature with chlorides in the presence of catalysts the new process has the advantage of being carried out at ordinary temperature and without the use of pressure. The new process is characterized by great simplicity and cheapness. After the treatment the liquor is found to be perfectly clean and can be used over again in the process.

The following example shows how the process is carried out. One thousand liters of waste soda liquors are placed in an open iron container in which copper filings or plates have been put, and this liquor it then treated with the aid of thirty liters of sodium hypochlorite lye for a period of two hours at ordinary temperature and at the same time it is thoroughly agitated with air. The cellulose derivatives are precipitated in the form of a flocculent or slimy mass and the liquor is finally freed from these masses by filtering through a filter press and the colorless and completely clarified liquor is recovered. German Patent, No. 432,413.

Regulating Paper Making Machines

FRENCH Patent, No. 612,648 is concerned with a process and apparatus for the regulation of paper making machine by means of steam turbines. It is a fact that the regulation of the paper making machine imposes certain duties on the driving motor which are very difficult for it to perform. The speed must be controllable between rather wide limits and when the speed is set at a given point it must not suffer any variation because that would result in a different thickness of paper or a different weight per unit surface area, which would be greater than the two percent allowance generally made on these properties of paper. It appears that the regulation effected through the agency of the back-pressure turbine has advantages that are not possessed by other systems.

In general this type of regulation is applied to paper making machines that make paper of one quality in large productions. The fact that the specific steam consumption of the turbine increases slightly as the speed diminishes is not an inconvenience in the present case, for the demand of the papermaking machine for steam used in drying the paper rests between certain limits which does not vary for various manufacturing speeds. When the speed of the papermaking machine is slow, it produces a paper which is thicker, since the quantity of the pulp deposited per unit time on the wire can be chosen to be equal to that deposited at greater manufacturing speeds for the production of thin papers. The amount of water that must be removed from the paper is almost the same in both cases, so that the steam consumption for heating remains unchanged.



The device which is the subject of this patent allows the paper machine to be run at all speeds while there is a good relationship between the quantity of steam that is required for heating the drying cylinders and for the mechanical work that is performed by the turbine. This requires the existence of an electrical distribution system in the mill but this is commonly the case in pulp mills. The feature of this improvement consists in that the steam turbine which actuates the paper making machine has connected with it at the same time a dynamo-choke which is connected to the electrical network, and which works either as a motor or a dynamo, which means that it can either furnish energy to the shaft of the turbine or the paper making machine or absorb mechancial energy as well.

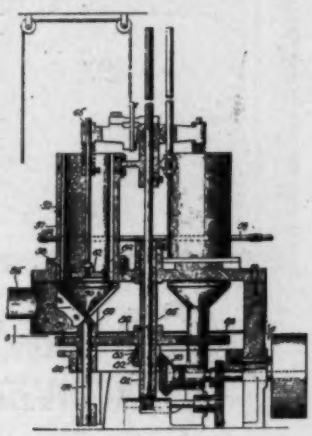
The latter situation arises when the demands of steam for heating are great in comparison with that for furnishing power to drive the paper making machine. The turbine will then develop more energy than is required to drive the machine and hence it releases the amount of steam that is necessary for heating.

The illustration is merely diagrammatic of one method of carrying out the invention. The steam turbine is seen at (a) and (b) are the pulleys and belts connecting the driving shaft with the paper making machine. A direct current machine (b) is mounted on the driving shaft and this electrical machine is connected with the electrical lines at (d). The installation is made in such a manner that automatic regulation of the speed of the paper making machine is assured, the steam turbine (a) being regulated for constant back-pressure. A small dynamo tachometer (e) is connected with the direct current dynamo (c), and this undergoes variations in tension due to the changes that take place in the speed and thus the rapid action regulator (g) is actuated.

This then influences the field (f) of the direct current machine (c), regulates the power that is developed by this machine in such a manner that the speed remains constant. The magnetic field regulator (h) serves to control the different speed values which must be maintained constant. This enables simple and certain regulation to be obtained.

Paper Pulp Making Apparatus

THE illustration shows an apparatus for the manufacture of pulp products. It comprises a revolving member which has a cone shaped seat which is adapted to engage the end of a stick of fibrous material. There are a number of radially extending knives which are carried by this rotating member and which are adapted to cut successive layers of fibrous material from the stick. There is also a guide cylinder which is located parallel to the axis of rotation of the rotating and adapted to guide the stick into engagement wtih the knives. United States Patent, No. 1,613,839.



Water Content of Sulphite Cellulose

A QUICK method for the determination of the water content of sulphite wood pulp is described in Der Papier Fabrikant, 1926, pages 783-4. The apparatus which is used for this purpose is shown in the accompanying illustration.

A round bottom flask (a) made of Jena glass and about 700 cubic centimeters capacity has a ground portion at its neck, shown at (b), whose internal width is approximately five centimeters so that the flask can be easily filled and emptied. The distilling device (c) fits into the ground neck of the flask and the form of this device is easily seen from the illustration. The end of this device is loosely inserted into a receiving and measuring apparatus. The latter is made all in one piece. The distillate flows through the measuring tube (d) into the lower end where the enlargened portion (e) contains sufficient acetylene tetrachloride to be made to overflow due to the collection of water. The excess acetylene tetrachloride is collected in a second enlargement (f) and can finally flow out of the apparatus through the tube (g) into a suitable receiver. The measuring tube (d) consists of a calibrated glass tube of approximately twenty centimeters length and about three millimeters internal diameter. It can hold about two cubic contimeters and is divided off into 0.02 cubic centimeter divisions. The amount of pulp that is taken for analysis depends of course on its water content.

The manner of making an analysis is as follows. A weighed amount of pulp in piece of about 4 x 5 millimeters or strips of 4 x 50 millimeters is placed in the boiling flask and then acetylene tetrachloride is poured over it so that the pulp floats in

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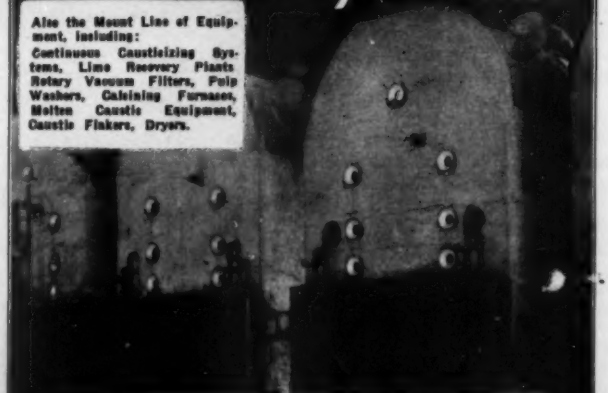

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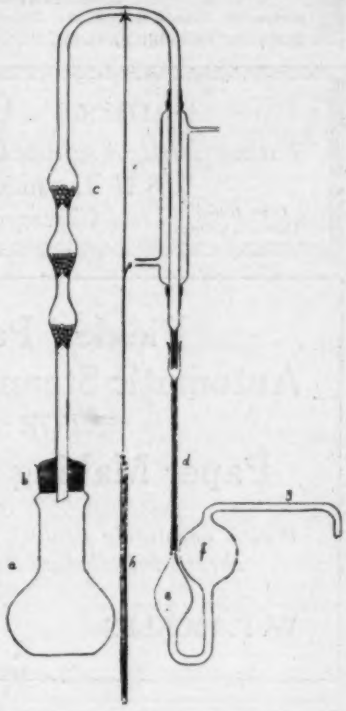
the liquid. Then the flask is carefully heated over the free flame and the acetylene tetrachloride is brought up to the boiling point. The heating is continued more strongly so that approximately eighty to one hundred cubic centimeters of the liquid is boiled over in approximately ten minutes. Care must be taken during the entire operation to see that the pulp does not adhere to the glass walls of the flask and become overheated, which is immediately detected by its turning brown. An asbestos screen (h) is placed between the heated flask and the collecting and measuring apparatus in order to prevent radiation of heat from affecting the latter. A larger flask is placed below the heating flask to collect the contents of the latter in case it breaks, but the author says that many hundred tests have been made with the apparatus without this happening even once.



The water content of the pulp goes over very rapidly with the first portions of acetylene tetrachloride. The last portions therefore make the distillate cloudy. The distillation is continued for such a time that the distillate again comes over as a clear liquid. Repeated control analyses showed that an absolutely clear mixture need not be expected for the error that is introduced in this way is not large enough to matter. The suspended amount of water is only about 0.05 cubic centimeter. The total time of the test is approximately thirty minutes.

After cooling, the flask is empted, and the pulp is pressed as strongly as possible in a hand press and then preserved in a well stoppered bottle. When a sufficient amount of pulp has been obtained the acetylene tetrachloride is contained in the pulp is removed by evaporation with steam, this quantity of the solvent being precipitated in the condensate over water, then dried over calcium chloride and filtered and then redistilled in case it contains too much dissolved fats and resins. It is necessary to test the acetylene tetrachloride from time to time for its acid content and to neutralize this acid by means of suitable alkali (solid).

Tables of results and curves are given in the original article, which was published in Der Papierfabrikant, 1926, pages 783-5. These results are termed very satisfactory.

Foaming of the Paper Stock

CONSIDERABLE foam and many ensuing difficulties arise at various points in the manufacture of sized paper, where the mixture of stock and water is kept in active circulation or where fresh water or back water, that has been purified, is added to the mixture. The foam carries along with it fillers, fibers, dirties the machines and leaves spots on the paper.

Most of the paper sizes, that is the organic substances, such as rosin soap, animal glue, casein and the like, possess capillary-active properties and foam considerably in their solutions. The foaming problem is not solved or given a complete investigation by the mere examination of these substances, for the reason that in addition to these materials the addition of alum to the pulp, the acidity of the liquor, the impurities in it, the free rosin content of the rosin milk and the quantity of animal glue added for sizing purposes all play important roles in this process.

The author has investigated the influence of the concentration of the rosin in the case of pure solutions of sodium resinate and also that of the free rosin content, so as to eliminate the influence of the impurities that are always present in the technical rosin soap. The measure for the degree of foam formation is the height to which the layer of foam arises when the mixtures are shaken in a glass vessel or test tube, while conditions are maintained constant. The relative surface tension of the solutions were then determined by means of the Traube stalagmometer. The results showed that the maximum foam formation was attained in the case of neutral sodium resinate with a one per cent soap solution, and that the maximum of foam formation always increased as the percentage of free rosin in the mixture likewise increased. The reason for setting a maximum beyond which one should not go is due to the fact that at this point hydrolytic splitting of the rosin soap takes place, whereby free resinic acid is precipitated either in flocculent or colloidal form, which results in the preventing or reduction of foaming.

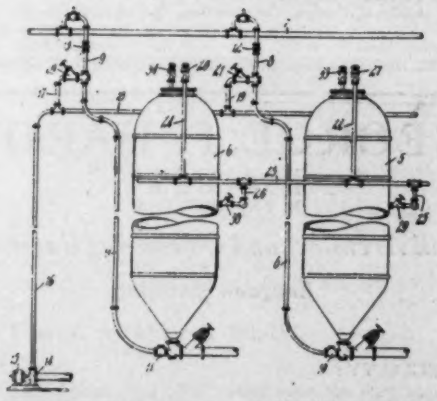
The results have also shown that the ability of a 0.25 percent sodium resinate solution to form in the presence of aluminum sulphate depends in such a manner on the acidity of the solution that the foaming power falls to a pH value of 4.6 and then this minimum is retained up to a pH value of 5.8 and then as the concentration of the hyrdogen ions is further increased, the foaming power of the solution is also increased. The reason for this minimum foaming power between the pH values of 4.6 and 5.8 is that between these values aluminum sulphate is precipitated and this reduces the foaming, while both higher and lower acidities favors the foaming by preventing such precipitation from ensuing. These limits are not so well defined in practice due to the reason that the impurities which are contained in technical rosin also exert a strong foaming action between the aforementioned pH limits.

The action of the addition of animal glue to the 0.25 percent sodium resinate solution was also investigated. It was shown that an addition of gelatine up to a percentage of 0.05 percent had a strongly reducing action on the foaming of the size, but when more gelatine was used the foaming was enhanced. Nevertheless further experiments showed that when the percentage of gelatine was raised to 0.09 percent the foaming disappeared altogether, when the acidity of the liquor was 4.5. to 5.5, which means that the hydrolysis of aluminum sulphate was favorably influenced. The fact that this condition cannot be reproduced in practice is simply due to the presence of impurities in the rosin size.

For further details see the very interesting and valuable article in Pappers och Traevarutidskrift foer Finland, 31, 10, 1926.

Making Wood Pulp

UNITED STATES Patent, No. 1,612,484, is concerned with a method and apparatus for the manufacture of wood pulp as shown in the accompanying illustration. The essential feature of this process consists in conveying the excess bisulphite liquor and sulphur dioxide from one digester to the second digester. This is effected at a point which is removed at a certain distance from the top and bottom of the second digester.



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New York, February 1, 1927.

GENERALLY speaking, the paper market is exhibiting fair activity. It may be true, as many in the trade contend, that demand is somewhat spotty, ruling brisk for some classes of paper and proportionately slow for others, yet the aggregate movement of supplies into consuming channels is moderately large and most concerns affiliated with the industry—both manufacturers and merchants—are well engaged in attending to the wants of their customers. Of course, the last few weeks have constituted one of the quiet periods of the year for the paper industry, since demand invariably diminishes during the holiday and inventory season, but within the past few days the market seems to have regained its active position to some extent and now appears well on the road to a livelier condition.

The trade, with a few exceptions, is agreed that the volume of business is good. There is a consistent demand for most kinds of paper though it is very apparent consumers are placing orders against direct requirements and therefore in numerous instances are buying in rather small individual lots. Viewing the demand as a whole, however, there seems little doubt that as much or more paper is being produced and marketed at present than ever before at this time of the year in spite of the restricted operations of many buyers. It is not the scope of business that manufacturers complain of, instead it is the lack of profit that is realized under prevailing market prices of certain classes of paper. The fact mills of the country are so well equipped that, in some lines at least, more production is being obtained than the market can absorb makes for very keen competition in sales, with the result prices have worked down to an unfavorable level—from the point of view of the manufacturer. It would seem as though some readjustment of prices necessarily will have to be made if producers are to weather the period they are now passing through; if not, it appears a foregone conclusion some mills will switch from making certain kinds of paper to other classes. This, it is said, particularly applies to tissue paper and some descriptions of specialties.

Production of paper in the United States showed a slight reduction in November as compared with the preceding month, according to the monthly statistical summary compiled and issued by the American Paper and Pulp Association and affiliated organizations. During November the total output of paper and board reached 562,827 tons of all grades, contrasted with 566,569 tons produced in October, representing a loss of about 3 per cent, following a 0.4 per cent increase in October over September. November production also compared with 571,988 tons in September, 569,577 tons in August, 540,660 tons in July, 572,968 tons in June, 555,696 tons in May, 573,528 tons in April, 599,719 tons in March, 523,657 tons in February, and 548,820 tons in January.

During November manufacturers shipped out a total of 556,962 tons of paper, against 582,841 tons in the preceding month, leaving stocks at mills at the end of November amounting to 231,641 tons of all grades, compared with 224,777 tons at the end of October.

Newsprint production in the United States and Canada recorded a big gain during 1926, according to figures issued by the News Print Service Bureau. In fact, a new high record was established, far above any previous year. Mills in the United States produced a total of 1,686,695 tons, against 1,530,318 tons in 1925, and representing by a large margin the biggest tonnage of newsprint ever before manufactured in this country. Canadian mills produced a total of 1,881,737 tons of newsprint in 1926, showing a proportionately larger gain than in the U. S. over the 1,522,217 tons produced in 1925 in the Dominion. The combined production of the two countries totaled 3,568,432 tons last year, contrasted with 3,052,535 tons in 1925.

Newsprint output in the United States in December was 135,069 tons and shipments from mills were 136,501 tons, while production in Canada in that month amounted to 163,717 tons and shipments 161,922 tons, making a combined total of 298,786 tons produced and 298,423 tons shipped. Adding to the production of the regular newsprint mills reported monthly throughout the year the small amount made by mills whose product is chiefly other grades, the total North American output of newsprint in 1926 was 3,768,315 tons, of which 1,881,737 tons was made in Canada, 1,686,695 tons in the United States, 186,471 tons in Newfoundland and 13,412 tons in Mexico. This was a total increase of 606,511 tons or 19 per cent over 1925. Compared with the preceding year, the increase in Canada was 359,520 tons or 24 per cent, in the United States 156,377 tons or 10 per cent, in Newfoundland 89,883 tons or 93 per cent, and in Mexico 731 tons or 6 per cent.

During December the United States newsprint mills operated at 91.3 per cent of rated capacity and the Canadian mills at 92.4 per cent. Stocks of newsprint at U. S. mills totaled 12,030 tons at the end of December and at Canadian mills 14,345 tons, making a combined total of 26,375 tons, which was equivalent to 2.1 days' average production.

Production of box board in the United States amounted to 164,982 tons in December, showing a considerable decline from the 210,746 tons manufactured in the preceding month, according to the monthly statistical summary of the board industry compiled and issued by the U. S. Department of Commerce. This loss was due in most part to the closing down of mills during the period between Christmas and New Years. Board mills operated at 68.6 per cent of their rated capacity in December, against 86.8 per cent in November. They received orders for a total of 185,922 tons of board in December, compared with 182,750 tons in the preceding month, and had unfilled orders for 85,518 tons at the end of December, against 69,086 tons at the end of November. Shipments of board from mills during December aggregated 169,527 tons, contrasted with 205,915 tons in November, and stocks of board at mills at the end of last year amounted to 52,931 tons, compared with 57,936 tons at the end of November. Total production of board of all kinds in 1926 was 2,484,788 tons, showing a marked increase over the 2,275,992 tons made in 1925.

The tone of the market for newsprint is firm and supplies continue to move into consuming channels with little or no letup. Consumption is holding to a high level and appears likely to keep up for some time to come. There is a steady demand for wrapping paper and most mills are reported well fixed with orders, while quotations show no change of note. Book paper is in good call, particularly from contract buyers, and market prices rule steady. There is a fairly large demand for tissue paper and prices are quite firm on levels which manufacturers assert are too low—based on present production costs.

Fine papers are in more or less routine demand yet the volume of the movement from mills to consuming centers is reported fairly big, and quoted prices are maintained fully. It is stated that the fine paper situation—from a general standpoint—probably is healthier at the moment than has been the case in some time.

Boards are showing increasing market activity as their busy season draws nearer. The statistical position is good since manufacturers stopped production in the closing days of the old year and thus not only failed to pile up a surplus of board but succeeded in liquidating a fair portion of their stocks. Quotations have been advanced slightly on plain box boards to where mills name $45 a ton for chip board for delivery in New York City and $47.50 for news board.

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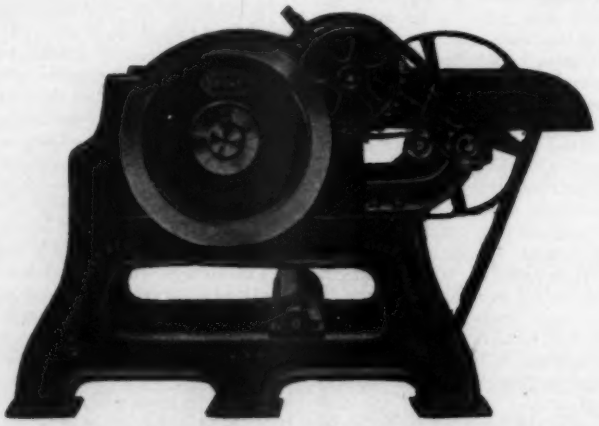
Paper Mill Engineers recognize more fully each day the advantages of Direct Connected units. Greater production and a finer quality of stock can be obtained and, because the speed of a motor is inherently uniform, a maximum quantity of a given grade of stock can be produced. Then, too, through the use of meters, the finishing point of the stock can be accurately indicated and the degree of contact of the Jordan knives can be determined more readily than when the "feel" of the operator alone is relied upon. Because belt pull is eliminated, the undue wear on bearings and eccentric position of the plug, so often found in Belt Driven units, is avoided.

Specifications and Prices Furnished on Request

THE NOBLE & WOOD MACHINE CO. **Hoosick Falls, N. Y.**

For list of our entire products, see page 387 in the 1925 Paper and Pulp Mill Catalogue



RAG CUTTERS

Whatever You Cut, a GIANT Will Solve Your Problem

LET US FIGURE IT OUT FOR YOU

Taylor, Stiles & Co., Riegelsville, N. J., U.S.A.

WATEROUS ENGINE WORKS
Brantford, Ont., Canada
Canadian Representatives

R. J. MARX
123 Finsbury Pavement, London E. C.
Sole Agents for Europe

Papermaking Rags

There appears to be a stronger condition developing in papermaking rags. At any rate, some classes of rags display a firmer price tone and it would seem that market circumstances are reaching a stage where higher prices will be witnessed. Dealers put much emphasis on the strength in values at supply sources, and also on the limited supplies available, and contend that an advancing situation in prices most likely will be seen in the near future.

The firmest class of papermaking rags at present are roofing rags. This is the time of the year when the market usually exhibits a tendency to rise because collections are lightest at this season, collectors in many parts of the country being handicapped by inclement weather in gathering supplies. An important factor, however, is the situation obtaining in Europe. It is a fact, according to importers in close touch with conditions abroad, that roofing rags are difficult to buy in numerous parts of Europe—that is, at the prices dealers can afford to pay at present against the figures papermakers in the U. S. are willing to grant. In Germany, whence a large portion of our imported supply of roofing stock comes, there is a big building movement in progress and consequently fewer roofing rags for export; moreover, paper mills in Germany are paying prices higher than are to be secured by dealers in export sales. In England and France dealers maintain there is little or no profit for them in exporting rags at prevailing prices bid from this side of the Atlantic, and supplies are being held back for more attractive prices. Thus, the supply situation in imported roofing rags is tighter than has been known in some time.

Insofar as domestic supplies are concerned, current available stock is limited also. Dealers are not going out and seeking to uncover supplies because there is so little inducement in the form of profit for them. Roofing paper manufacturers have engaged in little important buying during the last couple of months; this has been their dull season, and, not needing the rags, have held off purchasing. During February the felt marketing season starts up, mills increase their operations and consumption of roofing rags mounts. It is probable that if consumers come into evidence to buy on a larger scale, as they ordinarily do, and with the condition of supply obtaining as is now noted, prices will record a rising trend. On the other hand, it is known that some dealers have been quietly absorbing all the roofing stock, particularly foreign, they have been able to buy within certain price bounds in anticipation of a stronger market, and it may be that when manufacturers come in to buy an ample supply will be found available. It all seems to depend on demand or to what extent consumers discover they have need of and place orders for. At the same time there appears little reason to look for any recession in values; if there is a change in market levels, the probabilities are it will be in an upward direction.

The better qualities of papermaking rags continue dull. Demand is very spotty, paper manufacturers buying in a spasmodic fashion as their requirements arise, and there apparently is a sufficient supply—with a few exceptional grades—to satisfy the wants of buyers. Old white and blue cottons are selling in small-sized tonnage chiefly and at prices mostly in favor of consumers. New cuttings of certain descriptions are wanted in a fair way but others are more or less neglected. Fibre rags are in very slow movement, and rags for shoddy purposes are in slack demand decidedly.

Dealers quote 1.85 cents a pound or thereabouts f. o. b. shipping points for No. 1 domestic roofing stock, and 1.50 cents for No. 2 packing, while foreign dark colored cottons are fetching 1.70 cents and slightly higher ex dock New York and foreign linsey garments 1.90 cents. Prices of old white rags are nominal mainly at 6 to 6.50 cents a pound for No. 1 repacked, and 3 to 3.25 cents for No. 2 repacked, while repacked thirds and blues are quoted at 2.25 cents and rough packing at 1.75 cents at shipping points.

No. 1 white shirt cuttings are reported selling to paper mills at 11.75 cents per pound at dealers' points. Other grades of new cuttings inquired for include fancy shirt cuttings, at a price level of about 5.50 cents at shipping points; washables at 4.50 cents, blue overall cuttings at 7 cents, black silesias at 5.75 cents, and O. D. khaki cuttings at 5.25 cents. It is asserted production of cuttings is subnormally low, but the lack of voluminous demand from consuming quarters serves to offset this factor and there is consequently not much strength in market prices.

In foreign rags, trade activity is on a narrow scale other than possibly involving roofing stock. Quoted prices, however, remain in a rather stationary position with importers hesitant to sell at less owing to difficulties in buying abroad at cheaper rates.

Average quotations f. o. b. shipping points and ex dock New York are as follows:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	11.50-12.00
White shirt cuttings, No. 2	8.00- 8.50
Fancy shirt cuttings	5.25- 5.50
Washables, No. 1	4.25- 4.50
Unbleached muslins	10.50-10.75
White lawns	9.25- 9.50
Overall cuttings, blue	7.00- 7.25
Black silesias	5.50- 5.75
Light flannelettes	8.00- 8.25
Canton flannels, bleached	9.25- 9.50
Canton flannels, unbleached	8.25- 8.50
Shoe cuttings, bleached	8.75- 9.00
Shoe cuttings, unbleached	7.75- 8.00
Light silesias	7.00- 7.25
O. D. khaki cuttings	5.00- 5.25
Mixed khaki cuttings	4.50- 4.75
Corduroy cuttings	3.50- 3.75
Cottonade cuttings	3.75- 4.00
Linens, No. 1 white, foreign	13.00-13.50
Light prints, foreign	2.75- 3.00
Old Stock—	
Whites, No. 1 repacked	6.00- 6.50
Whites, No. 2 repacked	3.00- 3.25
Whites, house soiled	2.00- 2.25
Whites, street soiled	1.85- 2.00
Lace curtains	6.00- 6.25
Thirds and blues, rough	1.65- 1.80
Thirds and blues, repacked	2.15- 2.35
Black stockings	3.75- 4.00
Cotton canvas, No. 1	5.00- 5.25
White cotton batting	2.75- 3.00
Roofing, No. 1	1.80- 1.90
Roofing, No. 2	1.45- 1.55
Linsey, garments, foreign	1.85- 1.95
Dark colored cottons, foreign	1.70- 1.80
Blue linens, foreign	4.00- 4.25
Gray linens, foreign	4.25- 4.50
White linens, foreign	8.00- 8.50
Light prints, extra, foreign	1.75- 2.00

Rope and Bagging

A moderate amount of business is reported transpiring in old rope and bagging of some grades. Paper mills are confining purchases chiefly to lots immediately required, yet the market has shown some broadening since the holiday and inventory period and there is a better tone noticeable. Domestic old manila rope of No. 1 quality is meeting with a fairly ready sale to consumers, and 4.50 cents per pound at dealers'

A MARK OF RESPONSIBILITY ON PRODUCTS OF STANDARD QUALITY

ALUMINUM SULPHATE

The General Chemical Company manufactures to standards of purity and uniformity nowhere excelled—standards which are identical in each of the Company's many plants. Wherever you are, the chemicals you receive are of standardized General Chemical quality.

GENERAL CHEMICAL COMPANY
40 RECTOR ST., NEW YORK
Cable Address, Lyteurfus, N.Y.
BALTIMORE · BUFFALO · CHICAGO · CLEVELAND · DENVER · EASTON
LOS ANGELES · PHILADELPHIA · PITTSBURGH · PROVIDENCE · SAN FRANCISCO · SEATTLE
THE NICHOLS CHEMICAL CO., LTD., MONTREAL

SOLVAY

STANDARD IN SODA SINCE 1881

Quality and Service Guaranteed by the Largest Source of Supply

Soda Ash
Caustic Soda

Over 75 stock distributing points assure prompt shipment with minimum transportation charges.

Solvay Sales Corporation

Alkalies and Chemical Products
Manufactured by The Solvay Process Company

40 Rector Street New York

Boston Syracuse Chicago Indianapolis Cleveland
Cincinnati Pittsburgh Detroit Philadelphia
Kansas City St. Louis

GOOD RAGS FOR PAPER MILLS NEW CUTTINGS

The Leshner Paper Stock Co.

INCORPORATED

Hamilton, Ohio

Branch—Cleveland, Ohio

NATRONA POROUS ALUM

Liquid Chlorine

Single Unit Tank Cars . Multi-Unit Tank Cars
150-Lb. Cylinders (1-Ton Containers)

Commercial Sulphate of Alumina
Standard Bleaching Powder

Pennsylvania Salt Mfg. Company
Philadelphia, Pa.

RUSS GELATIN CO.

WORKS—WESTFIELD, MASS.

MANUFACTURERS OF

GELATIN and GLUE

ANIMAL SIZING GLUE STOCK

LARGEST SPECIALISTS IN AMERICA ON

FINE WRITING PAPER SIZING

E. F. RUSS COMPANY 287 Atlantic Avenue BOSTON, U. S. A.

shipping points is the price usually mentioned, while foreign old manila rope is bringing around 3.75 cents a pound ex dock New York. Mixed strings are selling at 1.10 to 1.25 cents a pound, depending on quality of packing, and sisal strings 1.75 to 2 cents per pound.

Bagging for roofing paper mills is wanted in good amounts and prices of this grade are firm on a basis of 1.35 cents a pound, or a bit higher, ex dock New York or f. o. b. dealers' points. It is said that in frequent instances No. 1 bagging is being sold to roofing mills because there is so little call from tissue paper manufacturers and other consumers of this grade of bagging. Nominally 1.75 cents a pound is asked for No. 1 scrap bagging but purchases doubtless are being made at less. Gunny is quiet and prices are around a level of 1.75 cents per pound for No. 1 gunny at shipping points.

F. o. b. shipping point and ex dock New York quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.75-2.00
Gunny, No. 1 foreign	1.60-1.75
Scrap bagging, No. 1	1.60-1.75
Roofing bagging	1.25-1.35
Wool tares, heavy	2.00-2.25
Wool tares, light	1.75-2.00
Manila rope, No. 1 foreign	3.50-3.75
Manila rope, No. 1 domestic	4.50-4.75
Sisal strings	1.75-2.00
Mixed strings	1.10-1.25

Old Paper

There is a livelier situation obtaining in old paper and the market displays a much steadier undertone than was the case earlier in the year when demand was held in check by holiday and inventory factors. However, board mills and other consumers continue to absorb supplies in a noticeably restricted manner, apparently having good-sized stocks on hand and therefore being enabled to buy on a reserved scale. Collections are somewhat limited, dealers being handicapped by inclement weather in gathering supplies, and the rather low level of available supplies of certain grades has made for a slight stiffening of prices.

Old kraft paper is quite firm in price. Dealers in the East generally ask 2.10 cents a pound for No. 1 kraft, and above this figure has been secured for extra quality packing. Shavings are steady on a price range of 3.40 to 3.60 cents a pound at shipping points for No. 1 hard white, and 2.85 to 3.10 cents for soft white shavings. Heavy No. 1 books are selling at 1.10 to 1.20 cents, white blank news at 1.60 to 1.70 cents, and ledger stock at 1.40 to 1.65 cents per pound. Old folded newspapers are reported available in the East at 55 to 60 cents a hundred pounds f. o. b. New York, and No. 1 mixed paper at 45 cents but in the Middle West higher prices prevail on these low grades.

The following are quotations named by dealers f. o. b. shipping points:

	New York and Chicago
Hard white shavings, No. 1	3.40-3.60
Hard white shavings, No. 2	3.00-3.25
Soft white shavings	2.85-3.10
Colored shavings	.90-1.00
Heavy book, No. 1	1.10-1.20
Crumpled book, No. 1	.85- .95
Ledger stock	1.40-1.65
Kraft, No. 1	2.00-2.20
Manilas, No. 1	.75- .85
White blank news	1.60-1.70
Overissue news, No. 1	.65- .75
Folded news	.55- .65
Sulphite mill wrappings	.70- .80
Mixed paper, No. 1	.45- .55
Common paper	.30- .40

Pulp Wood

Pulp wood demand is reported fair, with an especially steady movement against contracts. There is a firm undertone in prices, and sellers insist there is small likelihood of values receding owing to the high cost of cutting wood at present.

GDC

IF YOU are confronted with special color problems such as fastness to light, fastness to alkali or soap; or if you have two-sidedness troubles of delicate shades, let our newly equipped laboratories assist you.

230 Fifth Avenue
New York, N. Y.

GENERAL DYESTUFF CORPORATION

JOSEPH GATTI President and Treasurer

GATTI Paper Stock Corporation
Formerly with the Gatti-McQuade Co.

Paper Manufacturers' Supplies

COTTON AND WOOLEN WASTE

All Grades of Rags and Paper Stock, New Wrapping Paper, Box Board and Cordage

Main Office
41 East 42nd St., New York
Liggett Bldg.

Packing House
13th and Monroe Sts.
Hoboken, N. J.

Western Paper Makers Chemical Company
Paper Makers Chemical Company

Kalamazoo, Mich. Holyoke, Mass. Easton, Pa.
Jacksonville, Fla. Pensacola, Fla. St. Austell, England

Rosin Size, Satin White, Clays, Fillers
Foam Killer, Felt Soap and Other Specialties

IMPROVED BADGER BLACK LIQUOR EVAPORATORS

Recent Installation
NORTHWEST
PAPER CO.
Cloquet, Minn.

NON-FOAMING

MAXIMUM
STEAM ECONOMY

NO ENTRAINMENT

SODA and
SULPHATE
PROCESSES

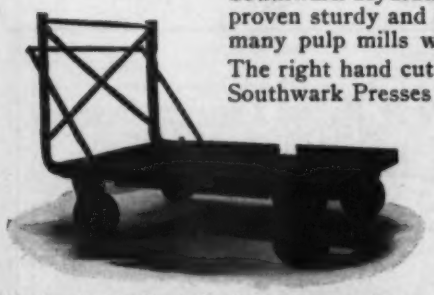
E. B. BADGER & SONS CO., Boston, U. S. A.

See page 314 in the 1926 Paper and Pulp Mill Catalogue

SOUTHWARK HYDRAULIC PRESSES

for Pulp, Sulphite, Baling, Etc.

HYDRAULIC PUMPS, VALVES, FITTINGS, SHOCK ABSORBERS, PULP TRUCKS, ETC.



Southwark Pulp Truck, for Use with Presses Shown at the Right. Saves Time and Labor

Southwark Hydraulic Presses for dehydrating pulp have proven sturdy and efficient machines in every one of the many pulp mills where we have installed them.

The right hand cut shows an installation of four 600-ton Southwark Presses in a large pulp and paper mill. These presses are designed for use with Southwark Pulp Trucks, the trucks are loaded and run under the press, the pulp being compressed directly on the truck.

This feature gives fast operation, saves labor and eliminates curbs, boxes or other containers on the press.

Four 600-Ton Southwark Pulp Presses, Minnesota & Ontario Paper Co., International Falls, Minn.

SOUTHWARK FOUNDRY AND MACHINE CO.

AKRON, O.
100 E. South St.

400 Washington Ave.
PHILADELPHIA, PA.

CHICAGO
343 S. Dearborn St.

Exports of pulp wood from Canada in 1926 were somewhat smaller than in 1925, doubtless reflecting the fact consumption in the Dominion is increasing. Official figures show that a total of 1,391,738 cords, valued at $14,066,030, was exported last year, contrasted with 1,423,502 cords of a value of $14,066,030 in 1925.

Mechanical Pulp

There is not a great deal of open-market demand for mechanical pulp, according to reports. Grinders in most instances have their production well sold and therefore are not pressing sales, so that the lack of selling pressure helps to offset the narrow demand and prices are characterized by considerable steadiness. Moreover, producers put much emphasis on the high cost of manufacturing under prevailing circumstances and declare there is little reason to expect lower prices; in other words, they take the attitude that if consumers want ground wood they will have to meet at least current prices to get required supplies, or otherwise manufacturing operations will be curtailed.

The weather thus far this winter has been sufficiently open, however, to permit grinders in a majority of localities to continue grinding, and this has eliminated considerable demand which usually appears in the transient market. This condition is especially true, it is said, as regards consumers in Wisconsin and other parts of the Northwest. Canadian grinders are quoting around $30 per ton f. o. b. pulp mills for prime spruce ground wood, freshly ground, for prompt shipment, with some supply available at a little under this price basis, depending on the haul to consuming centers and the air dry test. Prices of domestic ground wood are around $32 a ton f. o. b. pulp plants, while imported ground wood of Scandinavian origin is quoted at about $38 a ton ex dock New York for dry pulp.

Chemical Pulp

A steady tone marks quotations on domestic chemical pulp and most producing mills are keeping fairly busy and are reported well fixed with orders which will absorb the bulk of their output for some time to come. Changes in prices and in market conditions have been few and far between during the last month or two. Consumers in a good many cases have entered commitments covering their known requirements for a while ahead, and manufacturers are engaged in producing and shipping against these orders while at the same time managing to find buyers for some additional supplies. It appears possible that a little surplus of imported pulp has been created in this country but this has not affected the domestic pulp situation to any perceptible degree, and members of the trade generally are agreed that they look for no alteration of moment in market prices over the next several months.

Bleached sulphite of No. 1 grade is quoted at 4 to 4.25 cents per pound f. o. b. pulp mills, with special qualities ranging in price up to 4.75 cents. No. 1 strong unbleached sulphite is bringing around 3 cents, and book grade sulphite 3.25 to 3.50 cents at producing points. No. 1 kraft pulp is quoted at 2.90 to 3.10 cents a pound at shipping points, and bleached soda pulp at 3.75 to 4 cents.

Domestic production of wood pulp during November amounted to 215,720 tons, compared with 215,067 tons in October. During November 104,235 tons of mechanical pulp were produced, against 104,062 tons in the preceding month, and 111,485 tons of chemical pulp, compared with 111,005 tons in October.

Quotations f. o. b. pulp mills are as follows:

Bleached sulphite	4.00-4.75
Easy bleaching sulphite	3.20-3.40
Unbleached sulphite, No. 1 strong (news grade)	2.85-3.10
Unbleached sulphite, No. 1 book	3.25-3.50
Soda pulp, bleached	3.75-4.00
Mitscherlich, unbleached	3.25-3.50
Kraft, No. 1	2.90-3.10
Screenings, refined	1.40-1.60

Chemicals

Papermaking chemicals are enjoying moderate market activity and generally exhibit price steadiness. Casein is quoted from 15 to 16 cents a pound, duty paid, for the imported prod-

58% Soda Ash 76% Caustic Soda
Modified Soda Special Alkalies
Bicarbonate of Soda

Diamond Quality Alkalies are Nationally Distributed

THE Diamond Alkali Company is founded on the ideal of quality and service. ¶Its shipping facilities are unsurpassed, being centrally located to the great manufacturing centers and directly served by three trunk lines, assuring quick shipments over the shortest possible route. ¶Mixed carloads of alkalies are made up in any assortment required without extra cost to the consignee. ¶Local distributors maintain warehouse stocks for the convenience of consumers who require less than carload lots. ¶All this assures consumers a double quick delivery service of Diamond quality Alkalies in any quantity.

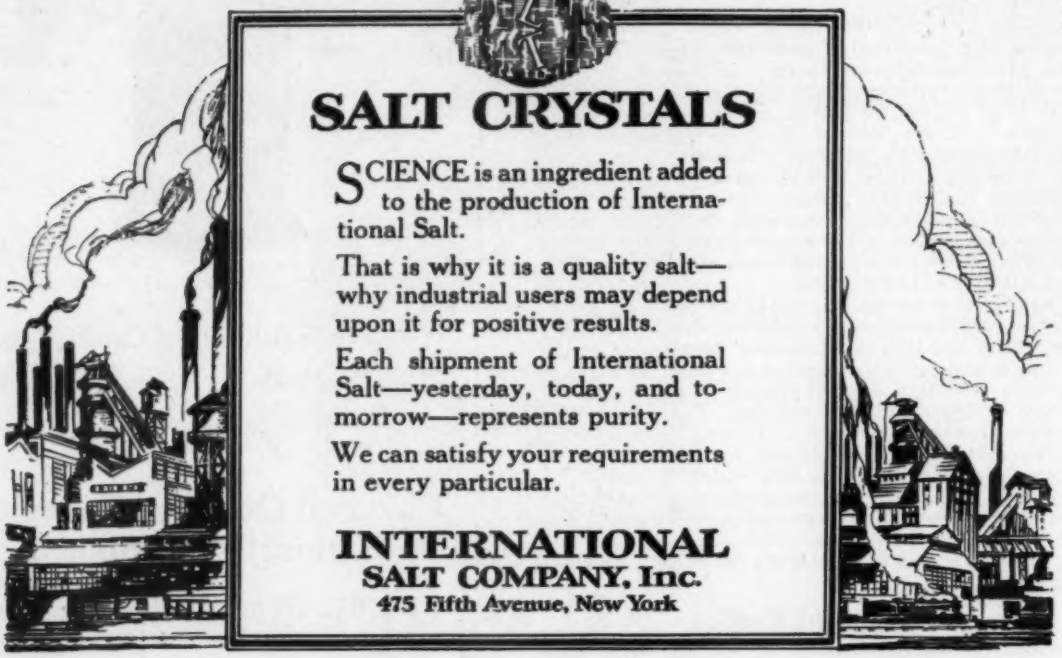
YOUR COMMUNICATIONS WILL RECEIVE PROMPT ATTENTION

ALKALI

Convenient Warehouse Stocks in Your Vicinity

Diamond Alkali Company
PITTSBURGH, PENNSYLVANIA

INTERNATIONAL



SALT CRYSTALS

SCIENCE is an ingredient added to the production of International Salt.

That is why it is a quality salt—why industrial users may depend upon it for positive results.

Each shipment of International Salt—yesterday, today, and tomorrow—represents purity.

We can satisfy your requirements in every particular.

INTERNATIONAL SALT COMPANY, Inc.
475 Fifth Avenue, New York

Uncle Jake says—

"The man who doesn't count his chickens before they are hatched, never sets the hen."

You will agree with us that he is right about it and you will also agree with us when we say that every business man should carefully select the tools of his craft to the end that he may slice off more and better business for himself this year than last year.

KVP BOND MADE IN U.S.A. will enable you to do this. How do we know it? Because thousands have proved it to their satisfaction.

KALAMAZOO VEGETABLE PARCHMENT CO. KALAMAZOO, MICH.

New Papers

Writing—	
White rag	15-40
White sulphite	10-30
Colored rag	15-40
Colored sulphite	9-30
Ledger—	
White rag	16-40
White sulphite	11-30
Colored sulphite	10-30
Colored rag	15-40
Bonds—	
White rag	16-40
White sulphite	8-30
Colored sulphite	8-30
Colored rag	15-40
Book—	
No. 1 S. & S. C	6.50- 8.00
Machine finished	6.25- 8.00
English finished	6.25- 8.00
Coated and enameled	8.00-14.00
Lithograph, M. F	8.50-15.00
Newsprint—	
Rolls, contract	3.25- ....
Rolls, transient	3.50- ....
Sheets	3.75- 4.00
Side runs	3.00- 3.25
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.75- .85
No. 2 white, 24x36	.70- .80
No. 1 manila, 24x36	.70- .80
Kraft	.90- 1.00
Wrapping—	
No. 1 Kraft	6.00- 6.50
No. 2 Kraft	5.25- 5.50
Southern Kraft	4.75- 5.00
Boards—	New York and Chicago
Solid news	47.50-50.00
Straw	52.50-57.50
Plain chip	42.50-45.00
White coated chip	55.00-60.00
Manila coated chip	50.00-55.00
Binder's board	70.00-75.00

Chemicals

(*Continued from page 1979*)

uct, and 15 to 16.50 cents for domestic casein, and demand of routine scope keeps up. Bleaching powder is moving fairly freely at a price range of 2 to 2.40 cents per pound for contract commitments f. o. b. works in large drums. Caustic soda is unchanged quotably at 3 to 3.10 cents a pound for spot shipment, while soda ash is selling at 1.32½ cents per pound for the product packed in bags.

Average quotations are as follows:

Alum, lump ammonia	3.50- 3.75
Alum, lump starch	3.75- 4.00
Blanc fixe, powder	4.00- 4.25
Bleaching powder	2.00- 2.40
Brimstone (long ton, at mine)	18.00-19.00
Casein (duty paid)	14.50-16.50
Caustic soda, spot delivery	3.00- 3.10
China clay, domestic washed	8.00-10.00
China clay, foreign	14.00-20.00
Rosin, grade E	12.05-12.15
Satin white	2.00- 2.25
Soda ash, 50 per cent light (bags)	1.32½- ....
Starch, papermakers', in bags	3.42- ....
Talc (ton)	16.00-18.00

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 23471—Cardboard box making machinery, and auxiliary machines to make cigarette boxes. Alexandria, Egypt. Purchase desired.

No. 23473—Newspapers, overissued, in bales. Canton, China. Purchase desired.

No. 23474—Newspapers, overissued, 1,000 bales per month. Canton, China. Purchase desired.

No. 23431—Wall board, Bilbao, Spain. Agency desired.

No. 23462—Paper working machinery. Breslau, Germany. Agency desired.

No. 23645—Board, press-pan. Milan, Italy. Agency desired.

No. 23643—Old newspapers, 50 tons per month. Colombo, Ceylon. Purchase and agency desired.

No. 23644—Paper bag making machinery. Panama City, Panama. Purchase desired.

No. 23645—Papermaking machinery. Milan, Italy. Agency desired.

No. 23671—Casein. Mannheim, Germany. Purchase desired.

No. 23670—Caustic soda. Amritsar, India. Purchase and agency desired.

No. 23717—Newsprint paper. Buenos Aires, Argentina. Agency desired.

No. 23681—Paper and paper specialties. Toronto, Canada. Purchase and agency desired.

No. 23850—Newsprint paper. Oporto, Portugal. Purchase and agency desired.

No. 23856—Wall paper. Osaka, Japan. Purchase desired.

No. 23760—Wrapping paper. Alexandria, Egypt. Agency desired.

No. 23861—Paper. Durban, South Africa. Purchase desired.

Printers and Papermakers Will Discuss Problems

A joint meeting of the Connecticut Valley division of the American Pulp and Paper Mill Superintendents' Association and the Connecticut Valley Club of Printing House Craftsmen will be held at the Nonotuck Hotel, Holyoke, Mass., beginning at 9 a. m., Saturday, March 5. Problems of the printer, together with similar problems of the papermaker, are to be discussed chiefly.

John J. White, Holyoke, Mass., is chairman of the Committee of Arrangements, which assures a successful meeting. He has asked printers to send samples of any papers, coated or uncoated, that have given unusual trouble in printing. Generous-sized samples are requested in order that the paper experts in attendance on the meeting may be enabled to make thorough examinations and tests.

Any printer, lithographer, paper superintendent or other person connected with printing plants or paper mills will be welcomed at both the business meeting and dinner and dance which will take place in the evening.

There will be but one speaker at the dinner, John J. Deviny, the international president of Craftsmen Clubs.

BATHURST LUMBER COMPANY, LIMITED

PRICE & PIERCE, LTD.
17 East 42nd Street, NEW YORK CITY

ARE NOW THE

SELLING AGENTS
for Bathurst Pulp in the United States

Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

BATHURST, NEW BRUNSWICK, CANADA

The B Co. Inc. QUALITY PULPS

HAFSLUND NORWAY

"HAFSLUND BEAR"
Bleached Sulphite

F: HAGA

"FORSHAGA"
Bleached Sulphite

KRAFT HURUM NORWAY SPECIAL

"HURUM SPECIAL"
Extra Strong Kraft

KOOS BAC

"BAMBLE"
Extra Strong Kraft

The Borregaard Company
200 Fifth Ave. Incorporated New York, N.Y.

THE NORTH WATER FILTER

Above cut is 20,000,000 gallon outfit for Northern Paper Mills. We have one 100,000,000 gallon installation and over 1,000 smaller jobs.
THREE SIZES.

Save-Alls Stone Bed Plates

See Page 347 in the 1926 Paper and Pulp Mill Catalogue.

GREEN BAY FOUNDRY AND MACHINE WORKS, Green Bay, Wis.

EXPORTS

Exports of paper from the United States in November last were slightly less, in point of value, than in the preceding month, but showed a little gain over the shipments in the same month of 1925. According to statistics issued by the U. S. Department of Commerce, total exports of paper of all classes from this country in November, 1926, were valued at $2,114,705, against exports valued at $2,204,717 in October last, and $2,039,283 in November, 1925.

In comparison with the preceding year, export shipments of newsprint from the United States recorded a marked decline last November, amounting to but 2,511,920 pounds, valued at $128,855, contrasted with 5,893,704 pounds of a value of $274,877 in November, 1925. Our largest shipments of newsprint last November were to China, exports to that country being 775,372 pounds, while shipments to the Philippine Islands were almost as large, amounting to 734,585 pounds.

Exports of book paper, not coated, from the United States in November last totaled 1,816,609 pounds, valued at $178,265, denoting a gain over the 1,179,400 pounds of a value of $131,366 exports in the same month of 1925. Exports of wrapping paper were slightly less in November, 1926, than in the same month a year previous, amounting to 2,250,711 pounds, valued at $147,355, against 2,280,799 pounds of a value of $161,457. On the other hand, export shipments of writing paper showed a considerable increase, totaling 943,525 pounds of a value of $151,324 in November last, compared with 475,763 pounds of a value of $75,867 a year before. Exports of box board climbed from 2,495,571 pounds in November, 1925, to 3,355,608 pounds in the same month of 1926, and exports of cover paper were more than twice the amount in November last, or 160,441 pounds, than in the same month of 1925 when shipments were 79,802 pounds.

IMPORTS

Wood Pulp

It is agreed generally in the trade that demand for imported wood pulp is rather slow. For one reason or another consumers manifest little desire to buy at present, and while there is a certain amount of business of routine character transpiring, the volume of demand is of slight importance and the market actually is quiet. Indications are that a majority of paper and board manufacturers in the United States have purchased pulp for forward shipment from abroad in fairly large tonnage, it being estimated that sales for 1927 shipment from Scandinavia and other sources in Europe up to this time are very close to, or on a par with, the sales at about this period a year ago for shipments during 1926, and since this is so and since most papermakers are a bit uncertain regarding the outlook, there is little inclination shown to contract for additional supplies at the moment.

The market has been dull ever since before the holidays. There has been some spotty activity but concerted buying has been lacking, and it has been noticed that most consumers, when exhibiting buying interest, have been bent on securing such supplies of pulp as they were willing to buy at price concessions. The tone of prices is firm, insofar as concerns forward shipments from abroad. Primary markets all are quite firm, with manufacturers in Sweden, Norway, Germany and elsewhere in Europe exerting practically no pressure on buyers here and seeming satisfied to wait out consumers presumably in the firm belief demand will develop in due time when American customers have better determined what their future requirements likely will amount to.

Spot lots of pulp in this country have changed hands in some cases at slight recessions in price, or at least at prices a bit under replacement costs abroad. The concessions allowed have amounted to but a dollar or two per ton, however, and have failed to have worthwhile influence on the market. In fact, most of the pulp sold on the spot here has been a resale proposition and therefore has affected the market situation but slightly, if at all.

Imports of pulp into the United States continue on a large scale, according to statistics issued by the U. S. Department of Commerce. During November a total of 110,933 long tons of chemical pulp was imported from all places, valued at $7,124,065, compared with 109,208 tons of a value of $7,082,997 imported in October last, and 98,506 tons of a value of $6,116,035 in November, 1925. November imports brought the total for the first eleven months of last year up to 1,149,690 tons, giving a monthly average of 104,517 tons, contrasted with 99,431 tons imported in each month of the same time of 1925. Imports of ground wood in November amounted to 23,850 long tons, valued at $693,616, against 34,931 tons of a value of $1,064,638 in the preceding month, and 31,344 tons of a value of $803,749 in November, 1925. Total importations of ground wood in eleven months of 1926 were 249,793 tons, giving a monthly average of 22,708 tons, as compared with an average of 24,238 tons monthly in the corresponding period of 1925.

Bleached sulphite is quoted at 3.75 to 3.85 cents a pound ex dock New York for the most popular grades though up to 4 and 4.25 cents is asked for some mill brands, while No. 1 strong unbleached sulphite is quoted at around 3 cents on the dock and No. 2 grade at 2.75 to 2.90 cents, depending on quality. Prime standard Swedish kraft is quoted at 3 cents ex dock New York, and easy bleaching sulphite at 3.25 cents. Dry ground wood is available at about $38 a ton or a trifle less on the dock at American Atlantic ports.

Current market quotations ex dock New York and receipts at the port of New York during January follow:

Bleached sulphite, No. 1	3.75- 4.25
Unbleached sulphite, strong No. 1	2.90- 3.15
Unbleached sulphite, No. 2	2.75- 2.90
Easy bleaching sulphite	3.20- 3.35
Mitscherlich unbleached, genuine	3.25- 3.60
Mitscherlich unbleached, ordinary	3.00- 3.15
Kraft, standard Swedish	2.95- 3.20
Ground wood, per ton (dry)	37.50-40.00

Castle & Overton, 901 bls. from Bremen; Bulkley, Dunton & Co., 910 bls. from Bremen, 3,900 Hernosand, 6,925 Gefle, 1,250 Iggesund, 6,825 Sundsvall, 540 Konigsberg, 3,300 Soderhamm, 125 Hamburg and 4,750 Helsingfors; American Exchange-Pacific National Bank, 4,200 bls. from Hernosand and 300 Sundsvall; Johaneson, Wales & Sparre, 5,730 bls. from Hernosand, 8,550 Sundsvall and 799 Gothenburg; Scandinavian Pulp Agency, 12,910 bls. from Skutskar, 7,755 Sundsvall and 1,016 Gothenburg; M. Gottesman & Co., 500 bls. from Iggesund, 2,500 Sundsvall, 660 Bremen, 700 Hamburg and 3,000 Sikea; J. Anderson & Co., 1,600 bls. from Iggesund, 2,500 Hamburg, 1,790 Greaker and 4,500 Hernosand; Pagel, Horton & Co., 1,500 bls. from Gefle; Atterbury Bros., 168 bls. from Bremen; Tidewater Paper Mills Co., 22,510 bls. from Liverpool, N. S.; National City Bank, 1,000 bls. from Hamburg; E. J. Keller Co., Inc., 1,031 bls. from Hamburg, 600 Rotterdam and 1,360 Bremen; Daniel M. Hicks, Inc., 168 bls. from Hamburg, 600 Sikea and 250 Copenhagen; E. M. Sergeant Co., 1,416 bls. from Gothenburg; Price & Pierce, Ltd., 3,450 bls. from Gothenburg and 800 Orviken; First National Bank

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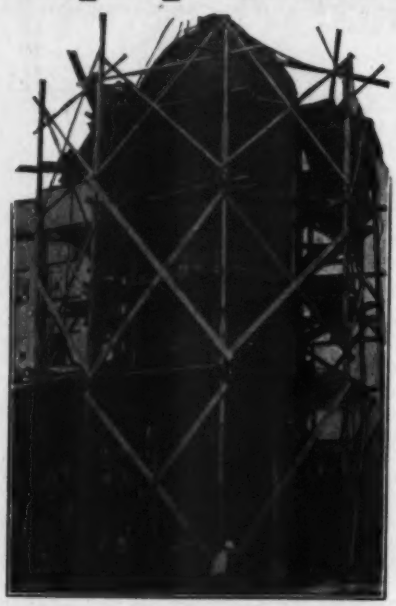

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Canadian Kraft Limited, Three Rivers, Canada
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of Boston, 1,525 bls. from Greaker; Empire Trust Co., 2,400 bls. from Sikea; Philadelphia Girard National Bank, 600 bls. from Sikea; Central National Bank, 2,530 bls. from Hamburg; Equitable Trust Co., 73 bls. from Antwerp; Order, 8,366 bls. from Kotka, 2,985 Bremen, 7,892 Konigsberg and 900 Helsingfors.

Paper Stock

Importations of papermaking materials other than wood pulp into the United States recently have reflected the rather quiet market condition prevailing in this country, and receipts have been comparatively small. During January some sizable shipments of rags arrived at the port of New York, and also moderate quantities of old rope, bagging and miscellaneous stock, but judging from receipts at that port last month, imports fell somewhat below normal.

Imports of papermaking rags during the first eleven months of 1926 amounted to 438,341,064 pounds, compared with 539,257,866 pounds in the same time of the preceding year, while imports of waste paper and bagging totaled 105,313,826 pounds, against 119,824,714 pounds, and of old rope and miscellaneous paper stock 75,678,497 pounds, against 62,437,989 pounds.

Imports of all kinds of paper stock other than wood pulp through the port of New York in the month of January, 1927, these data being taken from manifests of steamers arriving at that port during the month, follow:

Old Rope

Brown Bros. & Co., 256 bls. and 469 coils; W. Schall & Co., 558 bls.; William Steck & Co., 43 coils; Salomon Bros. & Co., 145 bls.; Ellerman's Wilson Line, 98 bls.; Central Union Trust Co., 88 coils; New York Trust Co., 97 bls.; Order, 33 coils.

Old Bagging

Bulkley, Dunton & Co., 492 bls.; J. Munro & Co., 105 bls.; Darmstadt, Scott & Courtney, 119 bls.; Castle & Overton, 323 bls.; J. M. Johnson, 56 bls.; A. W. Fenton, Inc., 92 bls.; Chase National Bank, 17 bls.; E. J. Keller Co., 1,095 bls.; Daniel M. Hicks, Inc., 120 bls.; Central National Bank, 34 bls.; J. W. Elwell & Co., 56 bls.; Order, 336 bls.

Rags

Paul Berlowitz, 786 bls.; J. M. Jaffe, 10 bls.; Victor Galaup, Inc., 230 bls.; E. Mayer, 156 bls.; S. Silberman Co., 57 bls.; A. H. Searle, Inc., 343 bls.; Stone Bros. Co., 265 bls.; C. Figli & Canovai, 29 bls.; Anglo-India Co., 80 bls.; J. W. Elwell & Co., 310 bls.; Baltimore & Ohio Railroad, 281 bls.; Castle & Overton, 333 bls.; American Wool Stock Co., 119 bls.; Daniel M. Hicks, Inc., 55 bls.; S. Dry, 68 bls.; L. H. Abenheimer, 61 bls.; S. Birkenstein & Sons, 297 bls.; Darmstadt, Scott & Courtney, 126 bls.; I. Hinerfeld, 6 bls.; William Steck & Co., 78 bls.; Bulkley, Dunton & Co., 97 bls.; G. P. Lotterhand, 2 bls.; Levy Bros., 45 bls.; E. Burrows, 48 bls.; Royal Mfg. Co., 69 bls.; Daniel I. Murphy, Inc., 794 bls.; Salomon Bros. & Co., 135 bls.; Atlas Waste Mfg. Co., 49 bls.; A. L. Phillips, 300 bls.; E. J. Keller Co., 1,758 bls.; National Bank of Commerce, 76 bls.; National City Bank, 111 bls.; Chase National Bank, 842 bls.; Central National Bank, 116 bls.; Equitable Trust Co., 420 bls.; Bank of America, 56 bls.; Bank of New York & Trust Co., 65 bls.; Chemical National Bank, 92 bls.; Bowery & East River National Bank, 189 bls.; Bankers Trust Co., 84 bls.; Fidelity Trust Co., 44 bls.; National Bank of Baltimore, 64 bls.; State Bank, 65 bls.; American Exchange Irving Trust Co., 26 bls.; International Mercantile Marine Co., 44 bls.; American Express Co., 40 bls.; A. W. Fenton, Inc., 164 bls.; Goldman, Sachs & Co., 511 bls.; Gallagher & Ascher, 67 bls.; American Overocean Corp., 275 bls.; W. Schall & Co., 358 bls.; Order, 2,071 bls.

Miscellaneous Paper Stock

Anglo-South American Trust Co., 91 bls.; William Steck & Co., 105 bls.; Equitable Trust Co., 266 bls.; Cohen & Co., 20 bls.; American Exchange Irving Trust Co., 99 bls.; American Express Co., 50 bls.; Brown Bros. & Co., 52 bls.; J. Cohen & Son, 8 bls.; G. M. Graves Co., 62 bls.; E. J. Keller Co., 293 bls.; Order, 324 bls.

Paper

Imports of paper and paper products into the United States during November last were 25 percent greater than in the

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The Mitts & Merrill Shredder will reduce magazines, books, old paper and boxboard, frozen or dried pulp laps, roll and sheet stock in a thoroughly economical manner.

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We also build a 100% efficient "Hog" to reduce pulp mill bark and wood refuse.

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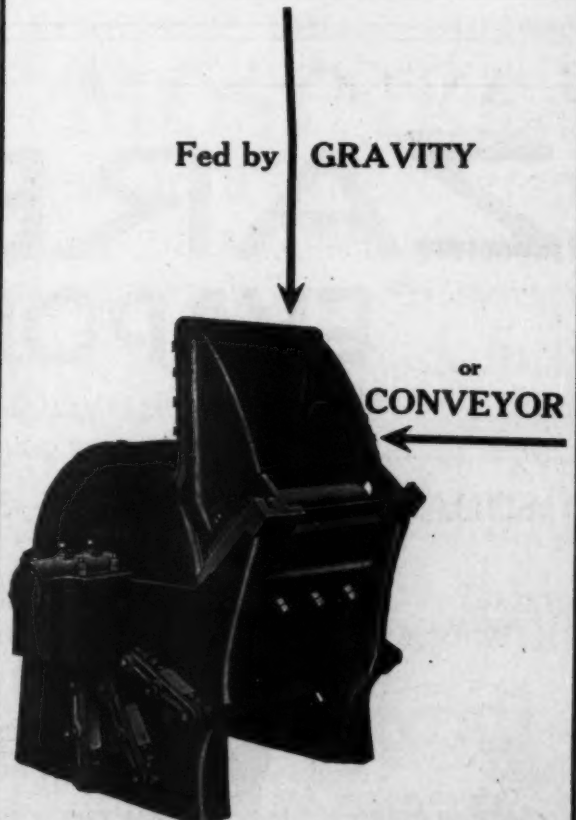

See Pages 372 and 373 in the Paper and Pulp Mill Catalog

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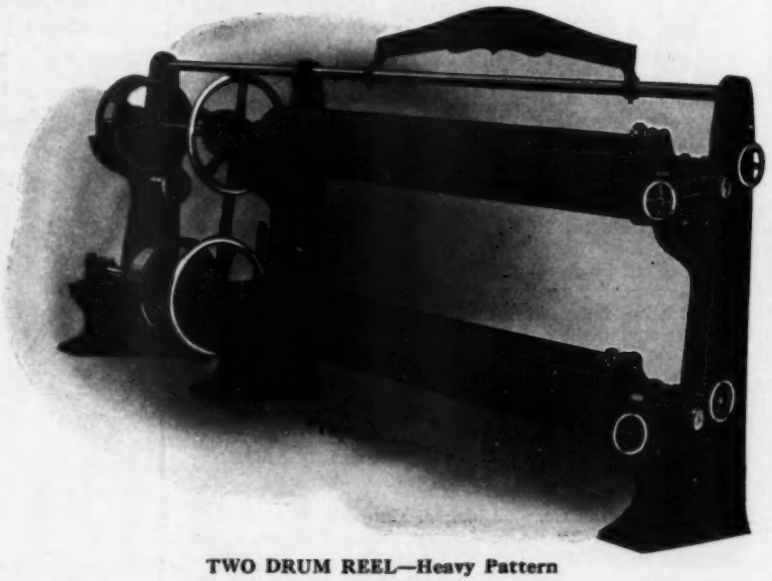

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BUILT FOR HARD WORK, LONG LIFE, AND NO WORRY TO THE OWNER

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HAVE ESTABLISHED AN ENVIABLE REPUTATION
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corresponding month of 1925, reaching a value of approximately $12,650,000, according to the U. S. Department of Commerce. November imports, however, showed a slight decline from the receipts in October, 1926. Newsprint imports, which always comprise from 85 to 90 per cent of the value of the total receipts, amounted to 339,154,000 pounds in November, a decrease of 2 per cent in comparison with the preceding month. Compared with November, 1925, aggregate imports, exclusive of newsprint paper, showed a rise in value of 10 per cent.

Imports during the month of January, 1927, were fairly large, judging from unofficial figures of arrivals at the port of New York. Importations of paper of all kinds through the port of New York last month, these data being taken from manifests of steamers reaching that port, follow:

Printing

B. F. Drakenfeld & Co., 68 cs. from Liverpool; J. P. Heffernan Paper Co., 15 bls. from Rotterdam and 10 bls. from Hamburg; A. S. Zabriskie, Inc., 187 bls. from Bremen; Parsons & Whittemore, 261 reels from Bremen; F. Henjes, Jr., 41 reels from Hamburg; Perkins-Goodwin Co., 155 bls. from Hamburg; Box Board & Lining Co., 102 reels from Hamburg; Maurice O'Meara Co., 38 cs. from Hamburg and 80 reels and 20 bls. from Bremen; Steiner Paper Corp., 149 bls. from Hamburg, 6 bls. from Oslo and 3 cs. from Rotterdam; E. Dietzgen & Co., 29 cs. from Hamburg and 11 cs. from Rotterdam; Oxford University Press, 5 cs. from Liverpool; American Exchange Irving Trust Co., 332 bls. from Hamburg; O. Ray, 78 reels from Gothenburg; New York American, 504 reels from Gothenburg; E. Walker, 31 bls. from Bremen; Guaranty Trust Co., 250 rolls from Oslo; P. C. Zuhlke, 99 cs. from Antwerp; Hudson Trading Co., 160 rolls from Hamburg; Order, 392 reels from Bremen, 39 rolls from Hamburg and 177 rolls from Helsingfors.

Wrapping

Steffen, Jones & Co., 35 cs. from Rotterdam and 32 cs. from Hamburg; Bendix Paper Co., 12 cs. from Hamburg; International Forwarding Co., 35 cs. from Rotterdam; A. Price & Son, 68 cs. from Rotterdam; Hudson Trading Co., 81 reels and 28 bls. from Rotterdam; E. Dietzgen & Co., 10 cs. from Hamburg; C. Steiner, 25 cs. from Rotterdam; Schenkers, Inc., 50 cs. from Hamburg; C. K. MacAlpine & Co., 235 reels and 22 bls. from Gothenburg; M. M. Cohen, 166 reels and 11 bls. from Gothenburg; Borregaard Co., 1,071 bls. from Gothenburg; American Express Co., 15 reels from Gothenburg; Arkell Safety Bag Co., 211 reels from Gothenburg; National City Bank, 17 bls. from Genoa; United Hardware & Tool Corp., 22 bls. from Bremen; Order, 1,950 bls. and 7 cs. from Antwerp.

Cigarette

R. J. Reynolds Tobacco Co., 200 cs. from Havre and 1,900 cs. from St. Nazaire; Standard Products Corp., 516 cs. from Havre; British-American Tobacco Co., 10 cs. fom Liverpool; M. Spiegel & Sons, 10 cs. from Bordeaux; American Tobacco Co., 1,300 cs. from Bordeaux; DeManduit Paper Corp., 650 cs. from St. Nazaire; Surbrug Co., 15 cs. from Havre; P. J. Schweitzer, 98 cs. from Marseilles.

Drawing

Keuffel & Esser Co., 170 cs. from Hamburg; International Forwarding Co., 38 cs. from Antwerp; H. Reeve Angel & Co., 5 cs. from London.

Filter

H. Reeve Angel & Co., 22 bls. from Southampton and 31 cs. from London; A. Giese & Son, 11 bls. from Hamburg; E. Fougera & Co., 91 cs. from Southampton; J. Manheimer, 94 cs. from Southampton; C. Sleicher & Scholl Co., 8 cs. from Hamburg.

Writing

Guibont Freres & Co., 4 cs. from Southampton and 24 cs. from Havre; Distinctive Writing Paper Co., 3 cs. from Havre.

Tissue

Schenkers, Inc., 137 cs. from Hamburg and 10 cs. from Bremen; I. M. MacDonald, 3 cs. from Kobe; Rieser & Co., 10 cs.

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Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

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If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

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from Kobe; M. Spiegel & Sons, 16 cs. from Hamburg; F. C. Strype, 29 cs. from Liverpool.

Hanging

W. H. S. Lloyd & Co., 5 pkgs. from Liverpool; A. C. Dodman, Jr., Inc., 28 bls. from Southampton and 87 bls. from Liverpool; J. E. Bernard & Co., 53 bls. from Antwerp; F. J. Emmerich & Co., 27 pkgs. from London, 68 pkgs. from Liverpool, 86 bls. from Hamburg and 8 pkgs. from Havre; C. A. Haynes & Co., 130 cs. from London and 6 bls. from Liverpool; Baldwin Universal Co., 3 bls. from London; Panama-Pacific Lines, 21 pkgs. from London; Erie Railroad Co., 4 bls. from Hamburg; F. A. Binder, 75 bls. from Bremen; R. F. Downing & Co., 118 pkgs. from London; F. & R. Trading Co., 264 bls. from Antwerp; Rohner, Gehrig & Co., 94 bls. from Antwerp; G. J. Hunken & Co., 8 bls. from Hamburg.

Photo

Globe Shipping Co., 283 cs. from Bremen; Gevaert Co. of America, 244 cs. from Antwerp; P. Puttmann, 5 cs. from Antwerp; P. C. Zuhlke, 2 cs. from Antwerp; J. J. Gavin & Co., 3 cs. from Liverpool; Order, 61 cs. from Antwerp.

Board

Andrian Vuyck, 3,169 rolls from Rotterdam; Brooks Paper Co., 10 cs. from Liverpool; A. Bourjois & Co., 18 cs. from Havre; International Acceptance Bank, 444 bls. from Rotterdam; Perkins-Goodwin Co., 399 rolls from Rotterdam; Insulating Co. of America, 40 cs. from Rotterdam; Premier Flong Co., 86 cs. from Hamburg; Fiber Board Mfg. Co., 25 bls. from Copenhagen; Standard Trunk Mfg. Co., 3 bls. from Copenhagen; Quaker Oats Co., 21 cs. from London; Coty, Inc., 60 cs. from Havre; Flashlight Paper Tube Co., 34 reels from Rotterdam; American Corrugated Paper Products Co., 168 reels from Rotterdam; J. P. Heffernan Paper Co., 107 reels from Rotterdam; Haas Bros., 108 reels from Rotterdam; Union Paper Co., 32 reels from Rotterdam; Order, 106 rolls from Antwerp, 635 rolls from Rotterdam and 76 bls. from Hamburg.

Miscellaneous

F. C. Strype, 66 cs. from Rotterdam, 128 cs. from Hamburg and 10 cs. from Havre; Kolesch & Co., 6 cs. from Rotterdam; Japan Paper Co., 84 cs. from Genoa, 22 cs. from Rotterdam, 30 cs. from Havre and 3 cs. from London; Keller-Dorian Co., 97 cs. from Southampton; Whiting-Patterson Co., 34 cs. from Southampton, 10 cs. from Hamburg and 14 cs. from London; D. C. Andrews & Co., 219 cs. from Hamburg and 3 cs. from Bremen; International Forwarding Co., 7 cs. from Hamburg and 159 cs. from Rotterdam; Charles W. Williams & Co., 28 cs. from Antwerp; Borden & Riley Paper Co., 21 cs. from Antwerp; E. Dietzgen & Co., 8 cs. from Rotterdam and 11 cs. from Havre; S. Gilbert, 58 cs. from Rotterdam; Causon & Montgolfer, 61 cs. from Havre; P. H. Petry & Co., 12 cs. from Havre, 10 cs. from Hamburg and 6 cs. from Rotterdam; Richardson Bros., 3 cs. from Liverpool; H. Reeve Angel & Co., 39 bls. from Southampton and 3 cs. from Yokohama; R. F. Downing & Co., 9 cs. from Havre and 13 cs. from Bremen; Pennsylvania Railroad Co., 38 cs. from Hamburg; Bendix Paper Co., 5 cs. from Hamburg; F. L. Kremer & Co., 24 cs. from Bremen; Hensel, Bruckman & Lorbacher, 4 cs. from London and 5 cs. from Rotterdam; Coenca-Morrison Co., 5 cs. from Havre; Defiance Sales Corp., 8 cs. from Havre; J. E. Bernard & Co., 6 cs. from Gothenburg; American Express Co., 4 cs. from Havre; Martin & Bechtold, 9 cs. from Bremen; Paul E. Vernon & Co., 26 cs. from Hamburg; A. Bourjois & Co., 11 cs. from Havre; Happel & McAvoy, 9 cs. from Havre; Tice & Lynch, 3 cs. from Southampton; Whitfield Paper Works, 45 cs. from Kobe; Milton Snedeker Corp., 14 cs. from Hamburg; F. Henjes, Jr., 62 rolls from Hamburg; Commonwealth Bank, 15 cs. from Hamburg; Louis DeJonge & Co., 22 cs. from Hamburg; Brown Bros. & Co., 6 cs. from Hamburg; Tamm & Co., 8 cs. from Rotterdam.

The following changes in organization of the International Paper Co., New York, effective January 1, 1927, are announced: Allen Curtis, first vice-president; Owen Shepherd, vice-president and treasurer; A. H. White, vice-president and chief engineer; Frank P. Lyden, manager of manufacturing, and Chester S. Colson, hydraulic engineer.

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Soda Ash

Caustic Soda

Bicarbonate of Soda

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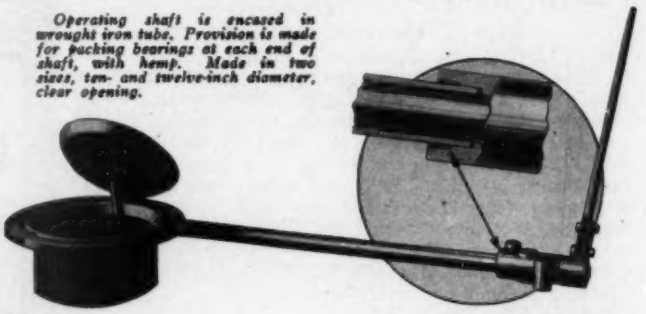
Brass valve seat and lid are correctly proportioned. The valve in general is durable, easily operated and installed, and is positive in action.

Operating shaft is encased in wrought iron tube. Provision is made for packing bearings at each end of shaft, with hemp. Made in two sizes, ten- and twelve-inch diameter, clear opening.



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"My notion of a perfect felt wuz one that wuz leaky as a sieve to let the water out and at the same time as tough as a Rhino hide to stand the gaff. And 'tis accordin' to yur ol' frend Ham Feltz' observin' and experience, the felt nearest approachin' this perfection is a Hamilton Wet Felt—leaky as a fish net and tough as life itself."

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Old Plates RECLOSED and RECUT to accurate gauge
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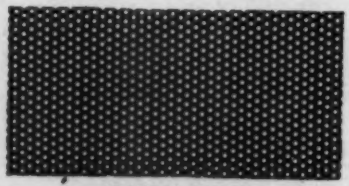
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed

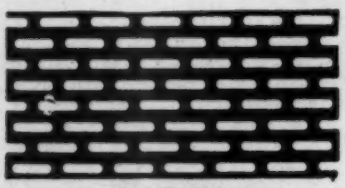
The Witham Screen Plate Fastener, Patented

THE ORIGINAL THE BEST

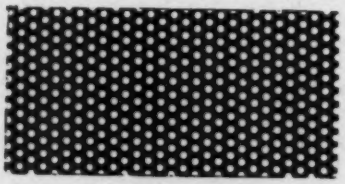
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



⅛ x ⅜" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

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Eastern National Forests Grow

The report of the National Forest Reservation Commission to Congress shows that in the 16 years' duration of this work, a total of 2,772,965 acres have been authorized for purchase by this commission for eastern National Forests, distributed as follows: Alabama, 92,945 acres; Arkansas, 98,668 acres; Georgia, 201,300 acres; Maine, 32,892 acres; Michigan, 50,080 acres; New Hampshire, 413,846 acres; North Carolina, 378,-366 acres; Pennsylvania, 243,986 acres; South Carolina, 41,-738 acres; Tennessee, 373,528 acres; Virginia, 585,796 acres; and West Virginia, 241,820, with a total of 2,722,965 acres.

During the past year the work under an appropriation of one million dollars has progressed without any material change in policy. A matter of significance is the extension of the purchase work to the Lake States where 50,000 acres are being acquired. The plans of the Commission call for the establishment of a series of National Forests not only within the Lake States but within the Coastal Plain region of the Atlantic States. These sites are not only being selected for timber production but are being located within the most important types of forests for demonstrational purposes. The report stresses the fact that there is urgent need for aggressive leadership in Forest Management in these regions, particularly in the Southern Pine Belt. It is desirable to determine the preferable methods of cutting timber for sawmill purposes and for pulpwood, the most advantageous practice in turpentining, and the effective methods of protection against fire. These will be important supplemental functions of National Forests in these regions.

The report calls attention to the progress in administration on the purchased lands. The area annually burned over diminishes from year to year as the protective system develops.

During 1926 these forests yielded a gross revenue of $123,696, this amount being less, however, than the returns for the two preceding years. Twenty-five per cent of these receipts go to the counties for roads and schools. Since the majority of the lands had been cut over when acquired, it has been necessary to dispose of a large amount of comparatively low-grade timber, and practically all the timber which is being sold is cut to improve the forests. Only a limited amount of timber of high grade is being sold at present. This accounts for the low receipts.

The purchase program in the Lake States looks forward to the acquisition of about 2½ million acres, and the objective in the Southern Pine region is for an equal area. This is in addition to the completion of the established units in the White Mountains, Appalachians, and Ozarks. It is the view of the Commission that the appropriation of one million dollars is inadequate to purchase National Forest lands on a scale commensurate with the forest needs of the Eastern States, and the Commission urges that an appropriation of three million dollars a year be made. The report can be secured from the Secretary, National Forest Reservation Commission, Washington, D. C.

Digester Breakdown in Cheboygan, Michigan

An unusual breakdown occurred without warning in the Union Bag and Paper Corporation of Cheboygan, Mich. The No. 2 digester, filled with acid and chips, and weighing more than 400 tons, settled about four and one-half feet through its concrete foundation into the ground.

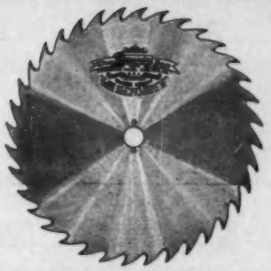
Eddie Zyble, digester cook, thought he observed the digester moving, and when he saw it sink about three inches, quickly signalled the men, who, fearful of an explosion, tumbled hastily out of doors and windows, fortunately without any injuries.

Although the exact cause for the breakdown is not known, it is believed due to insufficient provision against the clay soil on which the building was constructed.

D. B. Davies, who has been general superintendent of the Hoberg Paper and Fiber Co., Green Bay, Wis., has resigned his position and will go to Shelton, Wash., to have charge of manufacturing for the Rainer Pulp and Paper Co. This company expects to start their sulphite mill the latter part of April.

SIMONDS

Circular Saws and Machine Knives



For pulp and paper mills it is economy to use Simonds Saws and Barker, Chipper and Paper Cutter Knives because they hold their edge longer and cut faster. They are backed by a near century of experience. Write for catalogue and prices.

Simonds Saw and Steel Co.

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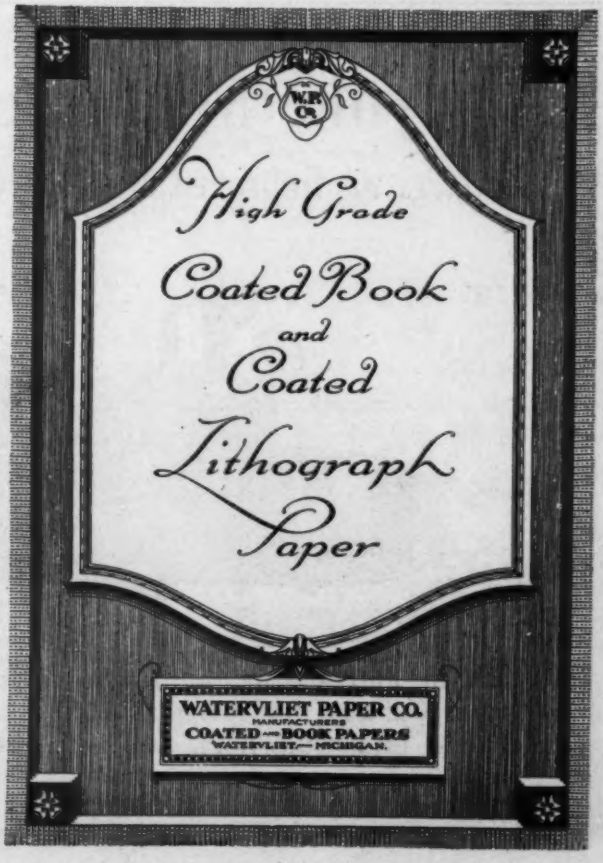

Experienced Paper Mill Men Prefer
BIGGS Bleaching Boilers

A WORD or two from any mill man who has used Biggs equipment would mean more to you than scores of statements by the manufacturer.

So, we are suggesting that you question any owner of Biggs Rotaries (nearly every plant is Biggs equipped). Ask for a frank opinion of Biggs equipment and you'll hear a story of constant service; of low chemical consumption; of economy in operation that has never been equaled.

Producing paper mill equipment for forty years, Biggs has kept step with progress by constantly improved products. Biggs Globe and Cylinder Rotary Bleaching Boilers, Cold Bleaching Engines for Sulphite Pulp, Digesters, and other equipment have always been built for long and faithful service.

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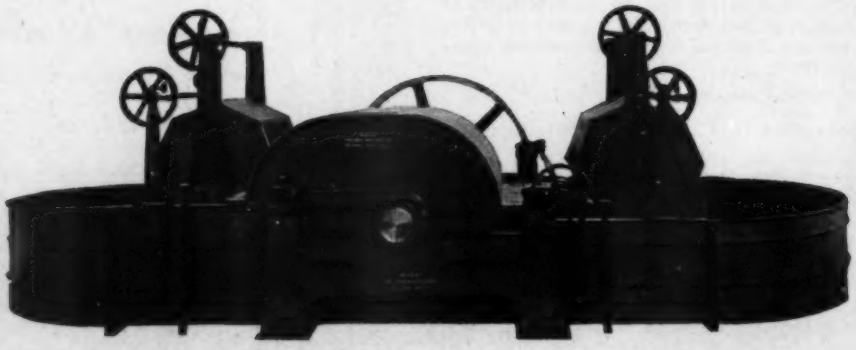

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